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A N
E N Q U I R Y

Into the Source from whence the Symptoms of the

S C U R V Y

AND OF

P U T R I D F E V E R S,
A R I S E;

And into the Seat which those Affections occupy in the
ANIMAL OECONOMY;

With a View of ascertaining a more just Idea of
P U T R I D D I S E A S E S
Than has generally been formed of them.

By FRANCIS MILMAN, M.D. F.R.S.
Fellow of the Royal College of Physicians,
And lately one of Dr. RADCLIFFE's travelling Physicians.

Ευχαταινέω μεν οὖν καὶ τὸν λογισμὸν ἦν περ ἐκ περιπτώσιος
ποιῆται την αρχην καὶ τὴν καταφορὴν ἐκ των φαινομένων
μεθοδεύη.

V. Hippocratis Coi Præceptiones.

L O N D O N:

PRINTED FOR J. DODSLEY, PALL MALL.

M.DCC.LXXXII.



T O T H E
RIGHT HONOURABLE
LORD SOUTHAMPTON.

M Y L O R D,

PERMIT me to take this public opportunity of offering You my acknowledgments for the kind protection and countenance You have upon various occasions shown me. Allow me also the honour of inscribing to Your Lordship the following pages ; which, though upon a subject

iv DEDICATION.

not immediately within the line of Your occupations, yet, relating in part to the preservation of a class of people so eminently serviceable as our Seamen, cannot be wholly uninteresting to You, who have the welfare of Your country so much at heart.

I have the honour to be, with great respect,

M Y L O R D,

Your Lordship's obliged

And obedient humble Servant,

FRANCIS MILMAN,

P R E F A C E.

*I*T has been remarked with some reason, but with a degree of surprize, that, although the history of diseases has of late years been considerably improved, the Science of Physick (if I may be allowed the expression) has made very little progress; and that, although the various disorders, which have engaged the attention of writers, have been described with uncommon accuracy, we have been far from attaining a thorough knowledge or comprehension of their natures, or from being able to give a rational explanation of their several symptoms. This circumstance, I am apprehensive, will, by many persons, be construed to the prejudice of our profession. Ingenuity may take occasion from it to question the solidity of the first principles upon which our opi-

nions have been grounded, and may with plausibility alledge, that the foundation of a structure may with some reason be suspected, which the addition of materials is incapable of advancing.

To satisfy ourselves, and to remove the doubts of others, it may become us to review the leading notions which have guided us, and to examine whether we may not unwarily have committed some mistakes in the fundamental principles which we have adopted; and whether it may not have proceeded from those original errors, that our art has not advanced, either in the manner which could have been wished, or in the degree which might have been expected.

When professors would teach us that every disease consists in some peculiar vice or depravity of the blood, it is certainly their duty to assure themselves of the existence of such vice or depravity; they ought to acquaint us with the specific nature of it in each case, and to inform us by what particular marks it is to be known and distinguished. Without these conditions, such vices or depravities can pretend to nothing

more than the name of Occult Qualities ; and the doctrines founded upon them are entitled to no more respect than those systems of philosophy which were founded upon a similar basis.

As the chymistry of our fluids in an healthy state, and their depravations in disease during life, are still acknowledged to be hidden in obscurity, it is no ways extraordinary, that those who have taught the above lessons should have been deficient in the particulars just mentioned : but it must ever be matter of astonishment, that, without such satisfaction, men of learning should have received their groundless assertions as established truths ; that they should have condescended to make use of such ideal properties to account for the real phenomena of diseases, or that any one should have given to such visionary hypotheses the name of Sound Theories.

Some authors, indeed, who have maintained those opinions, have attempted, in a few instances, to point out the supposed nature of the vitiated state of the blood : it has been said to be putrid in one disease, and to be acrimonious in

another. They have even pretended, in particular cases, to define the specific nature of the acrimony which prevails. To consider minutely how far, or with what exactness, each of those states or conditions of the blood have been distinguished by writers, would lead to much too extensive a field of argument for me to undertake. Some few circumstances, indeed, relating to a general and a particular acrimony, must, in the course of these pages, be necessarily produced. But the state of the blood first mentioned will be the principal object of my present discussion.

And here, though the term *Putrid*, when used to express the corrupt state of the dead substances of animals, has a precise and an obvious meaning, I would ask, whether there is not something extremely vague and equivocal in its signification, when applied to the diseases of the animal æconomy? *Putrid diseases* are said, by many authors, to consist in a putridity of the blood. But, though the temerity of practitioners of various descriptions has led them to perform venesection in the most virulent cases of this class,

class, though the sensible qualities of putridity are such as could not easily escape notice, where are the instances recorded of putrid blood drawn from the living body? or where is the physician of character who would assert, that a putridity of the vital circulating fluid would be for a moment compatible with animal life? Putrid diseases have been said, then, to be constituted by a cause which cannot exist. The doctrines, which have been founded upon this idea, will be shown to have been no less pernicious in their tendency, than groundless in their principle, and to have biassed improperly both our attempts to prevent and our endeavours to cure those complaints.

The histories of the Scurvy, and of Putrid Fevers, will, I trust, furnish me with particular and striking proofs of these general assertions. My enquiry into the accounts of the former disease, may conduct us to the causes of our long failure in preventing its ravages, and may, perhaps, assist us in explaining the reasons of Captain Cooke's singular success in the attain-

ment

X P R E F A C E.

*ment of that object *. Experiments on the actual state of the blood, both in the scurvy and in putrid fevers, made by the most able and unprejudiced physicians, will be adduced to show how extremely mistaken those persons have been, who have referred the proximate cause of the former to a putrefaction of the blood, gradually accumulated; and of the latter, to a quick and*

* The parts of the following book, which relate to the Scurvy, were read in July 1780 as the Gullston Lectures at the College of Physicians. This enquiry was first instituted merely to discover the causes of Captain Cooke's success in preserving his men from the scurvy, and to account for the symptoms of that disease. It was not my intention, at that time, to have pursued the subject of putridity in living animal bodies any further. There are some expressions at the beginning of this book which seem to show it; and, as I have not thought proper to alter them, it may not be amiss to mention that circumstance here to explain them. It may likewise not be improper to add, that the learned and ingenious Sir J. PRINGLE, who is often referred to in this book, died when the impression of it was considerably advanced.

a sudden

*a sudden corruption of it. These instances, whilst they may serve to prove the opinion, will teach us to admire the discernment, of one of the most respectable and most learned physicians of the age; who has long since observed, that “the more we are acquainted with the animal œconomy, the more reason we find to believe that the seat of diseases is not in the blood; with the sensible qualities of which it seems to have very little relation *.”*

I should not dwell so long upon these points, but from a conviction of the beneficial consequences which must necessarily result from a refutation of ill-grounded prejudices in matters of physick. I am not, however, unmindful, that such arguments tend only to establish a negative doctrine of putrid diseases. When I shall have invalidated the common notions which have been entertained of them, it will therefore be my endeavour to supply this defect, by ascertaining

* See Dr. Heberden's Papers in the Medical Transactions of the College.

Some principles upon which our opinions of them may with more certainty rest. This, as the most difficult, so is it the most important part of my task ; and, as its importance is the circumstance which incites me to the attempt, so, I flatter myself, its difficulty will procure me the indulgence of the public for any trifling oversight in the execution of it. To guard, as much as possible, against every sort of error, I shall first enumerate the predisposing and occasional causes which have been observed to be concerned in producing putrid diseases ; and, by a close attention to their effects, from the first change with which they affect the body to the most morbid alteration, I shall attempt to discover the proximate cause of these, or the immediate source in the œconomy from which putrid symptoms arise. This reasoning a posteriori I shall adopt, as the safest and as the only one which, in my opinion, should be admitted on medical subjects. From this mode of investigation I am induced to believe we shall learn, that the first morbid effects of the remote causes of these diseases, the first

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discernible

discernible alterations produced by them in the animal œconomy, will be to be found in an impaired state of the solids—of the moving muscular fibres. I shall make it my business to show, not only what that morbid change in the solids consists in, but by what means it is to be known and distinguished. Nor shall I, for this purpose, refer to any precarious or doubtful signs—to any imaginary properties, like the chymical qualities of the blood before-mentioned; but to some constant and sensible marks, perceivable in the altered manner in which the various functions of the body, its voluntary and involuntary motions, are performed. The principles I shall lay down will, I flatter myself, not only conduct us to the true and genuine source of putrid symptoms in general, but in some degree assist us in the solution of the variety of them in different cases.

The methods and the medicines made use of for the cure of the various modifications of putrid diseases will be described, and such of them

will

will be recommended as have been most approved by experience. The history of this part of my subject will show, that the opinions which I shall presume to reject, have led to a very inefficacious and unsuccessful mode of treating diseases of this class; and the present most advantageous methods of curing them, taught us, perhaps, like many other important lessons, by accident, will afford a strong confirmation of the doctrines I shall advance, and may suggest some useful hints to direct and to reform our practice, in those cases in which a want of success may indicate a defect of it. The explanation of the qualities of the remedies used in all these cases, will necessarily lead me to the consideration of the doctrine of antiseptics, as it has of late years been introduced into the systems of physick, and is now taught in the schools. I shall examine into the principle upon which it was first applied to the prevention and cure of putrid diseases. I shall enquire how far experience has confirmed our hopes of benefit from this extensive

tensive class of medicines ; and, as the advantage we have derived from them will not, I am apprehensive, correspond with the expectations which had been formed, I shall endeavour to account for our disappointment.

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ERRATA.

Page 63, Note, line last but 2, for " Recerche " read
" Ricerche."

Ibid. — line last but 1, for " Felicie " read Felici."

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T H E

I N T R O D U C T I O N.

IT has long been a subject of serious regret, that the occupation of a seaman, in its nature, perhaps, the most useful to society, should, at the same time, be the most fatal to human life. Salutary as the effect of sailing has in general been esteemed, it must appear extraordinary, that a greater mortality should have arisen from the virulence of disease, than from any accidents or inclemencies of the seasons. In the war preceding the last, more persons were said to have been

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destroyed

destroyed by the scurvy alone, than to have perished by the wreck of storms, and the united efforts of our combined enemies. Great, however, as is the number of seamen which have been carried off by this disease in a short channel cruize, amounting frequently in an inconsiderable fleet to many hundreds, a late celebrated navigator, with a company of one hundred and eighteen men, actually performed a voyage of three years and eighteen days, through all the various climates, from 52° north to 71° south lat. with the loss only of one man. The scurvy then, in a virulent degree, is not a necessary or an unavoidable attendant on the condition of a seaman. Its malignity surely must have arisen from negligence and ill management; since, by superior skill and judgment, it can be so effectually prevented.

To examine into the causes which have heretofore baffled our attempts to preserve the lives and the health of our sailors,
and

and to confider the means by which thofe objects have lately been fo well attained, may be matter of ufe and curious enquiry. To revife the speculative opinions and doctrines upon which our former fruitlefs preventives were founded—to correct the errors of our fyftems by the experience and the wifdom of Captain Cook, however humiliating to the medical profeflion, may certainly be beneficial to fociety. His voyage, if viewed without prejudice, may thus be doubly inſtructive. In the practice of the methods which he ufed, the feaman will learn to provide for his fafety from difeafe in the longeſt navigation. And as the knowledge, how the cauſes of the ſcurvy may in ſome inſtances be ſucceſsfully oppoſed, cannot fail to throw conſiderable light on its genuine character, the phyſician will be taught to improve his notion of it; and the accuracy thus acquired may perhaps enable him to deliver ſome general

rules for its prevention, not only in naval expeditions, but in every situation in which it is liable to occur.

Premising, therefore, a short account of some of the most striking features of the scurvy, I shall enter into a detail of all the predisposing and occasional causes, which have been any where, or at any time, found to contribute to its production. This will be the more necessary; because, as it will appear, on the one hand, that upon a due consideration of these only, a general and a rational mode of prevention can be founded; so will it be seen, on the other, that from a neglect of these, or from a misapprehension of their tendency, all our former miscarriages have entirely arisen.

The distinguishing marks of the scurvy are, a great weakness of the whole body, increasing gradually and slowly for days and weeks together, and accompanied with a lassitude or sense of fatigue, which has the
peculiarity

peculiarity of being more sensibly felt after sleep, than on going to rest. The gums bleed on a slight touch. They separate from the teeth, and become fungous and putrid. The breath is very offensive ; and livid purple spots are often seen in different parts of the body.

C H A P. I.

Of the Predisposing Causes of the Scurvy.

THE circumstances which give a predisposition to this complaint, are various and numerous.

1st. They are observed to be particularly susceptible of it, whose health has been impaired by preceding illnesses. When it attacked the Imperial army in Hungary with great virulence, the persons who suffered principally were those who had been previously weakened by frequent relapses into long and dangerous fevers *.

2dly. Indolence inclines people greatly to this calamity. The lazy and the inactive—the persons in a ship's crew termed fluggards by the sailors—are the first attacked. It is known to be particularly inci-

* See Kramer.

dent to those whose condition on board ship exempts them from much exercise. The Centurion, in which Lord Anson sailed round the world, affords a striking example of it. For of fifty invalids on board her, four only survived; and of seventy marines, all but eleven died of the scurvy. In the Dutch service it has likewise been observed, that if there were seven on board who had the scurvy*, four of these were marines, though the number of marines was much less than that of the sailors†. On shore it invades persons of sedentary occupations more readily than those who are engaged in more active scenes of life. For where the scurvy is endemic, the sedentary mechanic will suffer, whilst the laborious plowman will escape.

* Vide Rouppe de Morbis Navigantium.

† To this fatality among the marines their berths on board ship probably contribute likewise; the place allotted to them is the bay or fore part of the lower-gun deck, which is often wet and moist.

3dly. But it is not the want of exercise only which is pernicious, the excess of it is equally prejudicial. A man exhausted by fatigue is as liable to the attack of this disease, as one who is enervated by indolence. The physician * to the Russian army informs us, that the excessive fatigues of the troops which marched to Oczakow, were the principal reason why so great a number of them suffered from the scurvy. Besides the difficulties of their march, the old regiments had previously undergone great hardships during the winter: and the greatest part of the recruits, he adds, did not join the army sooner than when it was ready to march, or already in actual motion; and that though these were generally young raw fellows, excessively wearied after a long and tedious journey, yet it was not possible then to grant them any rest or refreshment. Being directly

* See Dr. Nitzsch's Account, in Dr. Lind's Book on the Scurvy.

incorporated into the several regiments, and entering at once into a new way of life, they were soon exhausted by military hardships, to which they had never been accustomed. The circumstances attending their marches did not at all alleviate the distress arising from the length of them. They were begun early in the morning, in the midst of thick fogs or cold dews. Towards the middle of the day the men were either oppressed with intolerably scorching heat and clouds of dust, or with heavy rains. The march was often protracted till noon, and sometimes beyond that period, according as water, wood, and forage, were to be met with in those desert places. Thus the soldier, after a tiresome journey, often quite spent with thirst, and enfeebled by the excessive heat of the sun, arrived at last in camp. But even here no rest could be permitted him. He was obliged, according as it was his turn, to go upon the piquet, or centinel's duty. — The hardships which the sick underwent,

went, were still greater ; they were carried in open carts, exposed to all the various inclemencies and vicissitudes of the climate—to rain, to dust, to heat, and to cold. They began their march long before, and ended it long after the rest of the army. They were then taken out, and frequently laid upon the cold wet ground, under moist canvas—a source of disease which the most robust constitution, much less an infirm one, could hardly resist. But though the Russians are among the more striking examples, they are not the only instances of the ill effects of fatigue, in inclining persons to this complaint. When the scurvy raged in Canada in 1759, the extraordinary hard duty of the soldiers was supposed to have contributed to its production.—An ingenious gentleman observes, that the reason why ninety persons were attacked with the scurvy at Fort-William, whilst only two soldiers out of four companies were seized with it at Fort-Augustus, and
but

but one in a captain's command at the barracks of Bernera, was partly owing to the duty being more severe at the first, than at the latter places.—As the soldier, though indulging for the most part in habits of indolence, is exposed, at times, to the most wearing exertions of strength; so likewise the condition of the sailor is, in this respect, subject to great vicissitudes. In general more apt to suffer from too little exercise, than from too much labour, the seaman is however, at times, forced to undergo the most extreme degree of fatigue. A ship's crew is ordinarily divided into two classes or companies, each of which takes its turn to watch four hours at a time. By this means every man has four hours rest for four of duty. This remission from labour, if it could be wholly devoted to refreshment and sleep, would be fully sufficient to recruit the strength of men but little reduced by the ordinary duty of the ship. But in rainy and tempestuous weather, as
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the severities of duty increase, the means of rest and refreshment diminish. Before he has time to dry himself, and to get warm in bed, the sailor is recalled to his post, and undergoes the same toil he had just quitted. Deprived in this manner of the restoring benefit of sleep, his strength is gradually worn down, and he is rendered susceptible of disease from the slightest causes. It was partly owing to this circumstance, that the crew of Lord Anson's squadron, at a moment when they least expected it, in the mild climate of the coast of Mexico, where they had a plenty of good water and fresh provisions, were so miserably afflicted with the scurvy. The number of his men, at this period, was so reduced, that all on board the squadron did not amount to the complement of a fourth rate man of war. An harder task of duty fell of course to the lot of those who remained. Thus circumstanced, they were beat about for seven weeks by variable and contrary winds ; and their ships

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at this time too were so leaky and shattered, that the officers, as well as the men, were obliged to work continually at the pumps.

4thly. The most frequent and most constant predisposition to this complaint, is derived from cold and from moisture. History gives us very few instances of any extraordinary scenes of distress arising from the scurvy, in which either one or both of these causes combined have not exerted their influence. It was the observation of an early writer on this disease, that cold damp lodgings contributed greatly to its production — that its malignity was increased by raw exhalations from the wet and damp walls of houses; but that people living in drier apartments were less subject to it. When it made such havock on board Lord Anson's squadron, on his doubling Cape Horn, the weather had been very tempestuous. Great waves rolled continually over the ships. Cutting winds, bringing

bringing snow and fleet with them, benumbed the limbs of the sailors. In like manner, at the siege of Azoph, when the Russian army suffered also very severely from it, the soldiers had been exposed to very piercing cold weather, accompanied with frequent rains, fleet, and snow. It is from these causes, that in northern latitudes, and in moist swampy situations, this disease is often found to be endemic. In Greenland it is said almost always to subsist; and it was formerly in a very peculiar manner prevalent in the Low Countries—in Holland and in Friesland. With but very few exceptions indeed, which will be hereafter mentioned, it is particularly incident to all the northern nations.

5thly. A gloomy sorrowful state of mind, is another circumstance which gives a strong predisposition to this complaint. It attacks the discontented, the repining; whilst persons of more chearful dispositions escape. Hence it is, perhaps, that newly-impressed

impressed seamen are found to be particularly liable to it; and that the inhabitants of besieged towns are observed to be very susceptible of its impressions. Hypochondriacal people, and persons of a melancholic temperament, have always been remarked to be so particularly prone to it, that the hypochondriacal disorder, the atrabilious habit, and the scurvy, have, by many ancient writers, been considered as different degrees of the same disease: and the latter has been said to proceed from a redundancy of the atrabiliary humours.

C H A P. II.

Of the Occasional or Exciting Causes of the Scurvy.

THE occasional or exciting causes, applied to persons under any of the predisposing circumstances which have been mentioned, and co-operating with them, will produce the scurvy. These exciting causes are principally three; a diet of difficult digestion; food containing but little nourishment; or, certain passions of the mind. The disease is most frequently occasioned by a sea-diet; which consists chiefly of two sorts of articles—unfermented, mealy, and farinaceous substances—and salted or dried flesh and fish. The bread of seamen is hard biscuit, which undergoes little or no fermentation in baking, and is consequently
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of much more difficult digestion than well-leavened or well-fermented bread *. Their puddings are made of pickled suet, flour, and water, boiled together, forming a glutinous tenacious paste, which requires the utmost strength of the powers of the stomach to assimilate into nourishment. The other articles of what is called fresh provisions are peas, or ground oats; which latter, boiled to a consistence with water, are commonly called burgow, or are made into water-gruel, and drank of a morning for breakfast. Beef and pork preserved by salt, butter and cheese, make out the seaman's ordinary bill of fare; for drink, government allows, where it can be procured, good sound small-beer; sometimes brandy, rum, or arrack, according to the places where the ships are stationed.

* See Dr. Lind's excellent book on the Scurvy; to which I am indebted for this observation, and for other very useful information.

The provisions furnished by the Dutch government to the ships in their service, though not exactly the same, are very similar to those with which our navy is supplied. The breakfast of their sailors is grout, with beer as long as the beer lasts, and afterwards with water and vinegar. Their dinners and suppers are made on peas and stock-fish, with butter and vinegar, except on Sundays and Thursdays, when their dinners consist of peas and hog's-lard, with half a pound of bacon to each man. The bacon, though in less quantity, is substituted in the place of the Irish fish and flesh, which being generally hard, dry, and salt, is now disused. Besides the above articles, a gentleman of great experience, who served long in the Dutch navy, informs us, that they were supplied with pearl-barley, rice, and millet *. It is the opinion of a learned gentleman †, that a sea-diet is only

* See Dr. Rouppe, de Morbis Navigantium.

† See Dr. Lind's Book on the Scurvy.

prejudicial,

prejudicial, as it is of difficult digestion, and that its pernicious effects do not arise from the salt it contains. I believe every view of the subject will tend to the confirmation of this idea. It appears from Dr. Lind's own experiments, that a long and continued use of salt-water will not give the disease to persons in health; nor, when taken by persons afflicted with an inveterate degree of the scurvy, does it add to its malignity. The spirit of sea-salt has even been recommended as a means of preventing it. We shall find, on examining the history of the complaint, that persons predisposed to it, and living on any indigestible food, whether it be of an animal or vegetable nature—whether it be preserved with salt, or not at all impregnated with it—will be equally attacked with the scurvy; and they are observed to suffer the most, who make the freest use of those indigestible substances. The Dutch eat fewer hard and salted meats, and, living more on pearl-barley, rice,

rice, bread, &c. are less afflicted with it than the English. The diminished frequency and severity of the distemper among the Dutch sailors, has indeed been ascribed to a little pickled cabbage*, which they have been said to eat at times with their food. But this notion is contradicted by the testimony of Dr. Rouppe, who observes, that in the voyages he made, cabbage was never given to the men. I have seen, says he, the officers eat them, but never remember to have seen the sailors. The Russian army had no salted provisions whatever, but the scurvy attacked them with the greatest virulence. Harassed and exhausted as they had been by a long march in bad weather, when they arrived at their destination, and undertook the siege of Azoph, they had but little fuel to dry themselves, or to dress their victuals. The fat indigestible fish of the river Don, which

* Sawyer-kraut.

was their food, being ill dressed, and their bread ill baked, produced frequent sicknesses, and precipitated them into this misfortune. In the Imperial army, the officer and the soldier, the dragoons and the infantry, were all exposed to the moist impure air of Hungary: but the scurvy attacked those chiefly who, after frequent relapses, and a final recovery from fevers, made use of a crude viscid diet. The army had fresh beef in plenty; their other food consisted of the grosser farinaceous substances, coarse heavy bread, and a sort of glutinous pudding, called “Rollatschen.” It is remarkable, that the Bohemians were the people who lived chiefly upon the last-mentioned article, and they were almost the only persons who suffered from the scurvy. Van Swieten furnishes us with a curious fact, to shew how any indigestible matter, irritating and weakening the stomach, may be apt to excite this complaint. He observed, that old acrid cheese (such as is frequently

eat in Holland) proved extremely prejudicial to persons who were predisposed to the disease, and exasperated every symptom in those who were already seized with it. Even after a recovery, he says, there was no cause which so certainly and so quickly brought about a relapse, as the use of that indigestible substance. In 1633, the Dutch Greenland Company left seven stout sailors to pass the winter in that country, in order to get observations made on the climate, &c.: they were plentifully furnished with provisions of every sort from the ships; but this provident care proved a very baneful store to them. Such an indigestible diet, concurring with the cold of so northern a latitude, rendered them scorbutic; and they became the miserable victims of the curiosity of their countrymen. Not deterred however by the fate of these unhappy men, the Dutch Company, the year following, repeated the experiment in the same manner, with the same event. It seems extra-

ordinary,

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ordinary, that they should have profited so little by the example of eight Englishmen, who were accidentally left there in 1630: though wholly unprovided with any means of subsistence, from June till the month of May following, but such as they could procure by their own address and industry, they not only kept free from the scurvy, but everyone of them survived the disaster. They had neither bread nor biscuit. They had no sort of vegetable matter or spirituous liquor in their diet. Their drink was water; their food chiefly the flesh of the rein-deer, of bears, and such other wild animals as they could kill. Had the Dutch exerted themselves to procure the same sustenance, the issue of their experiments had probably been very different from what it proved; for the Englishmen whom we have mentioned, are not the only instances of persons being preserved from the scurvy by such a diet. The flesh of the rein-deer, though of the most animalized kind, and of

the most alcalescent nature, as well as that of the bears, yet being of easy solution in the stomach, gives the Laplanders, inhabiting a cold northern region, a total exemption from the disease, whilst their neighbours in a similar climate, but living in a different manner, are miserably afflicted with it.

2dly. Food containing but little nutritious matter, excites the scurvy, as well as substances of an indigestible nature. Hence it is frequently seen in the train of famine. During a scarcity of corn, it ravaged the poor inhabitants of the colder districts of Italy, near the Alps. They subsisted frequently on the decoctions of a few roots, and often passed whole days without any food at all *. I had the honour
to

* Nam raro Polenta ex farina frumenti Turcici, eaque sine sale, iis pro cibo erat : sed interdum paucis leguminibus, sæpius duris herbarum radicibus, et grossis, ubi suppeditaissent, in aquâ coctis, inutilibusque et inasuetis ejusmodi cibis sustentabantur atque etiam integros dies

to communicate to the College the cases of two poor women, who living for more than three months on an infusion of tea, without milk or sugar, and on bread, without any other ingredient whatever in their diet, suffered the most inveterate degree of this complaint.

3dly. Certain passions of the mind are observed to be very apt to occasion it. The

dies sine ullo cibo misere conterebant. Hyeme igitur ac vere anni illius, morbus ortus est, ex quo lassitudo et membrorum, quasi ex labore, fatigatio, maculæque varii coloris in summâ cute oriebantur : os et spiritus malè olebat—gingivæ tumidæ, cruentæ, exesæ, marcescentes erant, dentes lababant, et alicui excidebant interdum omnes, quoque saliva acris effluebat. Genua cruraque vago dolore torquebantur, cum quodam torpore : post quem levior fiebat nervorum resolutio. Interdum autem is dolor maximè urgebat, vel ubi pedes terræ insisteabant, non si se lecto æger continebat, vel ubi crura extendebantur : interdum hæc membra ita rigida erant ut complicari non possent. Inter hæc arteriarum pulsus exigui imbecillesque erant. Ac multo plures fæminas quam viros laborasse inventum est, &c. V. Tractatum Johannis a Bona de Scorbuto,

elegant

elegant writer of Lord Anson's voyage remarked, that when any event happened to discourage or to damp the seamen's hope of a safe return to their native country, the weak and the languid were laid up, and the deaths of those were hastened who had already been confined. In the mild climate of the coast of Mexico, when the strength of the small remaining crew of Lord Anson's squadron had been exhausted by continual labour at the pumps in bad weather, the grief occasioned by the dismal prospect of a long and dangerous voyage to be performed in leaky and shattered ships, probably operated powerfully to renew their misfortune. This seems to be a just and a natural way of accounting for the appearance again of the disease in a mild climate, when the men were furnished with plenty of water and fresh provisions ; a circumstance which has been matter of great difficulty to explain upon any of our systems. Nor has it been attempted to be removed by any other means,

means, than by saying, that sailors having once suffered from the scurvy, are more susceptible of its impressions a second time. This however (admitting it to be true) is only assigning a reason why the effect is produced so easily, and does not at all account for the existence of the cause. The solution I have given seems to be countenanced by every analogous view of the subject. Vander Mye presents us with a curious and diversified account of the effect of the passions of the mind in the scurvy during the famous siege of Breda. Upon the report of bad news it always spread astonishingly : but it was in a manner altogether checked by the arrival of agreeable intelligence.

C H A P. III.

Of the Prevention of the Scurvy.

THIS disease being the joint effect of its remote causes, the means to prevent it will consist either in counteracting the impression of each of its predisposing causes singly, or, if that cannot be accomplished, in hindering the application of the exciting causes to persons under their influence. Hence it is clear, that the methods of prevention must be as various as the circumstances which predispose to it, or the causes which excite it. To guard the convalescent, or to secure a relaxed constitution, we must restore the strength of the former, and brace the weak fibre of the latter. In these situations, the bark, the chalybeate medicines, the bitter drugs, the elixir of vitriol, have been

been judiciously and successfully administered. In these cases, too, gentle exercise promises great service ; for this purpose, on board ship, it has been found beneficial to put convalescents into a sling below the forecastle, or between decks ; from which mode of agitation they are observed to recruit both their strength and their spirits. It is of consequence that officers should indulge such valetudinarians, and that they should not be recalled to their duty before their health is perfectly re-established.

As we are to avail ourselves, among other things, of exercise, to restore the strength of the convalescent ; so is the health, which is not impaired, to be preserved by the same means from the predisposing effects of indolence. The custom therefore of some captains of men of war in the Dutch service, in ordering their men frequently to loose and to unfurl the sails, seems to have been very justly commended, as they unite thereby the care of their health to their improvement
in

in seamanſhip. But, if indolence is to be avoided, as a means of enervating the body, ſo is it of equal moment to guard againſt fatigue, as tending to deſtroy its force. This great calamity of the ſcurvy, ſays the phyſician to the Ruſſian army, whom I quoted before, was greatly prevented by ſending the recruits much earlier, ſo that they had ſufficient time to be reſreſhed after their journey, and to be accuſtomed to the military life and diet, before they marched; as alſo by every regiment being provided with a certain number of covered waggons for their ſick, in which they were at all times ſheltered from rain, duſt, wind, and weather. The happy effect of theſe regulations was, that in an whole diviſion, conſiſting of ten or twelve regiments, they had ſcarcely as many ſcorbutic caſes as had occurred in the former campaign in one regiment only, and of theſe an incredibly leſs number died.

It

It is almost needless to use any argument to evince the necessity, or to point out the advantage of guarding against cold and moisture; which, as well as the fatigue of the men, were in some degree attended to in the Russian army. But there is nothing which will impress us with an higher idea of its importance, than the condition of the different parts of the crews of our men of war during the prevalence of the scurvy. The channel fleet has often buried an hundred men in a cruize, and landed a thousand more afflicted with the scurvy, and yet among the number there has not been a petty officer. How does the condition of the petty officer differ from that of the common sailor? The one as well as the other is obliged to live on the ship's provisions. The only difference is, that the petty officers sleep in close berths, as they are called, with canvas hung round, by which they are sheltered from the inclemencies

mencies of the weather *. Besides the advantage of warm cabins, they are more warmly clad, and, having a greater plenty of cloaths to shift, they are less liable to continue wet, or to be so unclean as the common men. The officer thus is seldom attacked with the scurvy, unless during its most violent rage, and when the sailors have been previously almost destroyed; at which time, they being themselves reduced to undergo the duties, hardships, and inconveniences of common men, they are exposed to the same consequences. Captain Cook seems to have been the first officer who has paid a proper attention to these rules, or at least the first who has been so thoroughly penetrated with a sense of their importance, as to have studied scrupulously to carry them into execution. He was careful to guard against the too great fatigue of

* Vide Dr. Lind.

his men, and to secure them as much as possible from the effects of cold and moisture. In the first place, he put them to three watches instead of two, (except upon some extraordinary occasions) by which means, they had eight hours rest for four of duty, and did not get the broken sleep which men in their situations have generally done. They had thus time to recruit their strength before they were summoned to return to their labour, and they were likewise thus less exposed to the weather, than if they had been at watch and watch. If the men got wet, they had generally dry cloaths provided to shift themselves. Proper methods were taken to keep their persons, hammocks, cloaths, &c. constantly clean and dry, and equal pains were devoted to keep the ship clean and dry between decks. The hammocks and bedding, every day that was fair, were not only ordered upon deck, but each bundle was unlashd, and so spread out, that every part

might be exposed to the air. Besides the ordinary methods of washing and scraping the decks, Captain Cook had some wood put into a proper stove, kindled, and carried successively to every part below deck ; which not only contributed to dry the ship, but, by heating the impure air below, and rendering it specifically lighter than the common air, to make it to rise, and to pass through the hatchways into the atmosphere *. In the torrid zone, he shaded his people from the scorching sun, by an awning over his deck. In his course under the antarctic circle, he had a coat provided of a substantial woollen stuff, with the addition of an hood to cover their heads. This garb (which the sailors called their Magellan jackets) they occasionally wore, and found it a most comfortable one for working in rain and snow,

* See Sir John Pringle's ingenious explanation of this process, in his elegant discourse delivered before the Royal Society, upon giving the prize medal to Captain Cook.

and amidst the broken ice, in the high latitudes of the South. The Russian boor seems to be greatly indebted to similar means for his preservation from the scurvy ; for, though he lives in an extremely cold climate, eats a good deal of salted meats, has no fresh vegetables for six months of the year, and breathes during that time the foul impure air of an unventilated apartment ; yet, cloathing himself in warm flannels, covering himself at night with warm sheep-skins, providing for his cleanliness by the regular use of the warm bath, he is seldom afflicted with this calamity.

Having remarked, that a melancholy sorrowful state of mind has been known to render people very susceptible of the scurvy ; it is to be presumed, that the opposite affections of gaiety and chearfulness will prove good preservatives against it. Officers, both in fleets and armies, have with this view found it beneficial, not only to permit, but to encourage their men

in amusements of various kinds. During the famous siege of Breda, the holding out hopes of effectual relief was attended with good consequences to those who were ill, and prevented others from being attacked, who seemed inclined to the disease. We have moreover the testimony of the elegant writer of Lord Anson's Voyage, that "alacrity of mind, and sanguine thoughts, are no contemptible preservatives against the fatal malignity of this malady."

All our resources to prevent this disease, are not derived from the various means of correcting its predisposing causes only. Where we find it impossible entirely to efface the impression of these, it will be adviseable for persons under their influence to be extremely cautious in their diet, and to avoid the application of its occasional causes. Captain Cook would not suffer the fat which is boiled out of the salt beef and pork, to be given to his men, as is customary. It did not escape that sagacious officer's notice,
that

that such gross indigestible matters had a great tendency to excite the scurvy. In Hungary, they who did not make use of a heavy tenacious sort of pudding, were not afflicted with it. In Greenland, and in Lapland, we have seen, a food of easy digestion, without any vegetables, has afforded the most perfect security under the strongest predisposition to the complaint.

But if the predisposing causes cannot be remedied, nor any other than a hard indigestible diet be procured, we should apply ourselves to the correction of those qualities of it by which it is pernicious. Let us use every means in our power to promote the solution of that food in the stomach, which by its hardness proves prejudicial. This was the wise conduct of Capt. Cook. He took care at all times to provide a plenty of fresh water for his men. Should other officers not be so lucky in opportunities of supplying themselves with it, as he was, the mode of sweetening salt-water,

by distillation, presents them with the means of mitigating, if not of totally remedying their misfortune. If the taste of such water should not be agreeable, it may be rendered palatable by the acid juices, the robs of lemon, oranges, &c. or, which is perhaps still better, by fixed air *, since the benefits of this, which is to be procured in all situations, and in any quantities, may be extended to ever so considerable a class of men; and its active stimulant properties are not only well suited in themselves to obviate the causes of this disease, but, by giving a lively acidulous taste to liquors, are well

* It seems to be regretted, that Captain Cook should not have made use of the method of impregnating water with fixed air, described by Doctor Priestley, and expressly recommended for trial by the Board of Admiralty, after having been approved by the College of Physicians, to whom, by the direction of the Board, Doctor Priestley had shewn the process, and who, as the learned Doctor informs me, agreed in opinion, that water so impregnated, promised to be of great use in preventing and curing the scurvy.

calculated

calculated to recommend the use of such as might otherwise be vapid and disagreeable. Nothing can set the propriety of attempting to disarm the occasional causes by a plenty of drinks in a stronger light, than the general observation of mariners, that a ship's crew seldom suffer much from the scurvy, till they have been reduced to a short allowance of small-beer * and water.

From what has been premised, then, it appears, that the means of preventing this disease must vary with the difference of situations and circumstances ; and that to aim at any universal rule of opposing its invasion, is equally absurd and empirical. The Bark, Steel medicines, &c. are well

* The infusion of malt, recommended by Dr. Macbride, must surely be a good substitute for the small-beer ; or, in the view I have mentioned, a good assistant with it, to prevent the scurvy. The character Dr. Lind gives it, seems to be a very just one, “ that it is a very nourishing liquor, well adapted for scorbutic patients.”

calculated to guard one just recovered from an acute disease, or to brace and to protect a relaxed phlegmatic constitution : but in the cold regions of Russia, such medicines would be poor substitutes for warm baths and flannel cloaths : and on the other hand, these, which are of so much benefit to the Russian, would serve only to increase the weakness, and to hasten the approach of the disorder to the infirm valetudinarian. By an attention to cleanliness, by guarding against fatigue, &c. by providing at all times a plenty of fresh water, Captain Cook's seamen lived with impunity on their salt provisions. In the very northern regions, in Greenland and in Lapland, notwithstanding the predisposing cold of those climates, a diet of easy digestion, without the aid of any vegetable substance whatever, has afforded equal safety.

It has arisen entirely from a neglect of these distinctions, that our endeavours to prevent the scurvy have generally been frustrated.

frustrated. Our views have constantly been directed to remedies for this complaint, which in some situations are difficult to procure, and for the most part but imperfectly attained: whilst employed in the search of a cure, we have neglected the means of prevention, which are often within our reach, and easily applied. Every officer may divide his crew into three companies, instead of two, (unless, perhaps, upon some extraordinary occasions.) By thus giving every man eight hours rest, instead of four, he may prevent his men from being exhausted by labour, or a want of sleep. Cleanliness may be supported by discipline. Cloaths may be procured to guard against cold, and the effects of moisture. Water may be for the most part provided. The consideration of the causes of this disease, would not only have taught us the utility, but would have shewn the indispensable necessity of attending to these objects to obtain an exemption from it. But we have
been

been led by delusive theories to represent other things of less moment, as matters of much greater consequence. Though the fatal experience of the Spaniards, more than a century ago, in the ineffectual exhibition of marmalades of various fruits, should have instructed us how little reliance is to be placed on matters of that sort, yet a greater stress has been laid, even in this age, on the due making, and on the right administration of the robs of lemons, oranges *, &c. than
on

* Captain Cook makes very little account of these preparations. They were tried, and they failed. The infusion of malt did what they could not perform. Sir J. Pringle wrote to Captain Cook, at Plymouth, just before he sailed upon another voyage, wishing him to reconsider this part of his narrative : but, grounded upon experience, he still adhered to his first opinion. Sir J. Pringle, however, though he bestows the highest encomiums upon Captain Cook's narrative, as an uncontested relation of the means by which he preserved his men from the scurvy, and as containing " neither the vain boastings of the empiric, nor the ingenious and *delusive* theories of the dogmatist," cannot give up the
inspissated

on the measures which have been mentioned. Sailors seem to have been taught to rely too much upon us, and too little upon themselves, and to expect that security from medicines—from specific antidotes—which is only to be derived from their own conduct and good management. The high authority of Captain Cook's name and example would, I should hope, reform this mode of proceeding. His narrative is very decisive upon these points. He assures us, “ that the introduction of the most salutary articles, either as provisions or medicines, will generally prove unsuccessful, unless

insipillated juices : but seeks to account for their failure. They were not, he says, given in sufficient quantity ; and yet it is particularly stated, that they were given in the dose specified to the surgeon, before he left England, and with so little advantage, that recourse was obliged to be had to other things. Sir John seems to have thought that they must necessarily be efficacious, because they were classed among the antiseptics : but this surely is supporting speculative theory against positive experience.

supported

supported by certain rules of living," which are such, for the most part, as have been suggested; and that, with an observance of those rules, "with plenty of water, and an attention to cleanliness, a ship's company will seldom be much afflicted with the scurvy, though they should not be provided with any of the various anti-scorbutics, as they are termed, with which he was supplied."

C H A P. IV.

Of certain Opinions which have been maintained with respect to the Proximate Cause of the Scurvy.

WE are now to consider what the joint effect of these remote causes will be, if our endeavours to prevent their co-operation should prove unsuccessful; that is, in fact, what is the essential nature of the scurvy; or, to speak in medical language, what is the proximate cause of its symptoms? In the state of organic weakness, or general debility, derived from the predisposing causes, it was the idea of Boerhaave, that any food received into the stomach, and being no longer affected, or but weakly acted upon, by the digestive powers of the body, would follow its own nature — That acescent substances would become

become acid—that alkalescent substances would become alkaline—and that neutral ones would remain unchanged—That from hence the species of the scurvy would be as various as the different nature of the matters producing it—That one scurvy would consist in an acid, another in an alkaline, and a third in a neutral or muriatic acrimony of the juices. But these are rather plausible inferences, than well-founded ideas. It is, I believe, agreed among physicians, that there is but one species of this disease. The difference even between the land and the sea scurvy, is to be found in books, not in nature. In the Russian camp near Azoph, in the Imperial army in Hungary, and among our seamen in the British channel, the disease has assumed the same character, and exhibited the same features. No essential marks of distinction, at least, have been observed. Boerhaave's doctrine of acrimony having been ably refuted by others, I shall not enter into it; but shall content myself with
observing

observing only, that Dr. Lind tasted the serum of the blood of persons in the scurvy, and found it made as little perceptible impression on the tongue as the white of an egg.

Another learned gentleman *, to whom the medical world is under infinite obligations, teaches us, that (excepting where it may be occasioned by a moist or putrid air, or a want of exercise or vegetables) the scurvy arises solely from a salt diet—that salted meats become in effect putrid, though they may continue long palatable by means of the salt they contain—that the mixture of the putrid juices of this food, with the mass of our circulating fluids, produces the scurvy; the proximate cause of which is said to consist in “a gradually accumulated putrefaction.”

It is matter of concern to me, to dissent from the learned author of these opinions,

* Sir J. Pringle.

and painful to me to have occasion to remark, that he does not appear to have formed a perfectly just estimate of the nature of the causes of this disease. It cannot but be remembered, that a great part of the food, even of a sailor (to say nothing of those instances where the scurvy has arisen during the use of fresh vegetables *) possesses properties opposite to putrefaction — that a great part of it is of the farinaceous kind, and of an acescent nature; as the biscuit, the pearl-barley, the rice, the peas, the beans, ground oats made into burgow or water-gruel, &c. Actual experiments shew that these substances, reduced to flour, moistened, mixed with saliva and water, and placed in an heat equal to that of the human stomach, actually fer-

* See Dr. Lind. Others likewise have recorded instances of the same kind. Dr. D. Monro relates the history of a scorbutic case, which arose during the daily use of vegetables. See the Medical Transactions of the College.

ment and produce an acid. It is not then in the mechanical admixture of such matters with our juices, that we can look for the source of a putrid contamination of our fluids. But it may perhaps be urged, that the tendency and nature of those acefcent substances are more than counteracted by the salt beef, the bacon, &c. “ These,” it is said, “ are in effect putrid.” As the learned author of this idea frequently makes experiments on substances out of the body the criteria, by which he judges of the properties they will exert within it, though I cannot but think such a mode of proceeding liable to exception, I have no objection to appeal to such tests upon the present subject.

If we should consult such experiments, and admit their conclusions, we should find reason to reverse this proposition, and to assert, that the noxious tendency of the salt-diet of sailors is corrected

E by

by the acescent ingredients of their food. Dr. Monchy, making use of the various articles of the seaman's fare, imitated the experiments with fresh meats by Sir John Pringle. With the various substances, dressed in the same manner, and in the like proportion as they are issued on board men of war, he mixed a certain quantity of human saliva. These mixtures he placed, during twelve or twenty-four hours, in a place, the heat of which was equal to that of the human stomach. By a close attention to the different changes and appearances through which they passed, he observed, first, that animal substances, as flesh, fish, and bacon, being mixed with those of the farinaceous kind, contract a tendency to putrefaction.

2dly. That by this tendency to putrefaction, they are capable of exciting a fermentation in unleavened farinaceous substances.

3dly.

3dly. That this fermentation will be produced by using farinaceous substances only ; but in a much more slow and languid degree than from the commixture of animal food or substances.

4thly. That the pouring water, beer, or vinegar, on those mixtures, produces little or no difference in the fermentations.

5thly. That the fermentation arising from the mixture of farinaceous with animal substances, is productive of a strong acid, which opposes and totally prevents all further putrefaction *.

6thly. That saliva, added to such mixtures, retards the putrefaction of animal substances, abates the fermentation of fari-

* This is similar to the result of an experiment of Sir J. Pringle's. Bread being mixed with sheep's gall, when the latter, after a few days, began to putrefy, it was corrected by the former ; and on the sixth day it seemed to be as uncorrupted as on the first.—Vide Exper. 28. of Sir J. Pringle.

naceous ones, and obtunds the points of the remaining acid.

So far then is the putrid or putrescent part of a sailor's food on board ship from counteracting or destroying the effect of the acescent ingredients of his diet, if such sort of experiments be to guide us, we should say, the contrary actually happens. A strong acid results from their fermentation, and predominates so as to act as a powerful antiseptic. But do salted provisions corrupt so quickly as they have been represented to do? Do they become putrid, and remain palatable only by means of the salt they contain? If that be the case, we must, with Arbuthnot, either ascribe a power to the stomach, not only of destroying the specific difference of every thing, but of converting even a putrid substance into wholesome nourishment; or, we must admit, that the acescent ingredients of a sailor's diet actually do render the salted provisions not only harmless, but nutritious. For Dr.

Lind

Lind assures us, that he has known messes, as they are called, of seamen, who have lived, during a voyage of three years, on the ship's provisions, for want of money to purchase better fare, especially greens, and yet have preserved their health. But supposing these salted meats to be as putrid as they have been represented, (which, I profess, I am far from thinking true) the argument will apply only to persons who living upon such food have fallen into the scurvy. It will not affect the cases of those at all, who have made use of no salted provisions, and yet have been severely afflicted with the disease. I have adduced the most respectable and undisputed testimony, that the Russians, who suffered extremely from the complaint, had no salted provisions whatever. The Imperial army in Hungary had fresh beef remarkably good and cheap. Had the moist impure air, or any supposed qualities in the water or liquor they drank, been the source of the disease, all those who from preceding illnesses, or

other causes, had been predisposed to it, should have suffered equally. But the Bohemians chiefly were the people who were attacked with the scurvy; and they were the persons who lived on an indigestible farinaceous pudding, called “Rollatschen.” It is particularly stated, that when the scurvy invaded Lord Anson’s crew on the coast of Mexico, they had plenty of fresh provisions and good water. The little sustenance of the poor people who were attacked by it in Italy, was of a vegetable and acescent nature.—The mechanical admixture of putrid juices, arising from food, cannot then be admitted to be a general source of the scurvy.

Let us for a moment wave all arguments *à priori*, and examine what proofs can be alledged of a putrefaction being actually and gradually accumulated in the blood of scorbutic persons, however it may be produced, from whatever sources it may arise. If putridity actually took place in the vital fluid,

its first effects would be to break down the texture of its parts, as it does that of every other body ; it must render it incapable of coagulation. We are still much in the dark with respect to the circumstances in general which influence the coagulation of the blood. But though we know that the parts of some blood, which is not putrid, is often very little disposed to coagulate and to concrete, yet we are certain that that blood which is putrid never can coagulate *. So far, however, is the blood of persons in the scurvy from not coagulating, that in the extreme degree of the disease, they who died of it suddenly, had the auricles of their hearts enlarged to the size of the fist, and replete with *coagulated* blood. So firm

* Putredo omnia vincula partium animalium rumpit, humores alioquin coagulabiles, cruorem, lympham, ovi albumen, amnii liquamen in acre et nullo porro veneno coagulabile tabum resolvit, &c. Vide Alberti Halleri de partium corporis humani præcipuarum fabricâ et functionibus opus. Tom. iii. p. 137.

was the coagulation of the blood poured into the cellular texture between the muscles, that it gave them an hardness resembling that of wood *. Dr. Lind bled, at different times, an hundred scorbutic patients, and found generally a perfect separation of the water and serum from the red concreted mass. The latter, in the last stage of the disease, was firm and compact, and often covered with streaks of what is commonly called gluten, or size of the blood. Dr. Rouppe likewise confirms the observation of the coagulation of the blood in the last stage of the disease, and adds, that the coagulum was then greater even than in the first stage. Relying, therefore, on this criterion of its coagulation, a criterion which Haller himself admits, I am warranted to conclude, that the blood of scorbutic persons is not in a putrid state. I have entered more particularly into the refutation of this idea, because the notion

* See Poupert,

has been no less popular than groundless ; and no less pernicious in its tendency than extensive in its prevalence.

It is confessed by some persons, that the blood cannot, indeed, be expected to be in an actually putrid state ; but that it is the strong disposition of the vital fluid to putridity, which constitutes the proximate cause of putrid diseases. This assertion seems to me to confound all propriety of language, and every rule of common sense. It is to say, that an inclination in the fluids to putridity, is the proximate cause of actually putrid affections. The propensity to any particular state must surely be short of the state to which it tends, and incapable of giving that which it has not itself attained. The essential nature of a disease must be constituted by something absolute ; nor is it to be sought for in any future possible or probable condition of the body. But though an inclination to putridity cannot therefore be considered as the proximate cause of a cor-

ruption already existing; let us, however, as a matter of curiosity, enquire whether such a proneness to putridity really takes place in the case before us or not. If it should be said, that the blood of scorbutic people is not, indeed, in a putrid state, but in a condition nearly approaching it, what is the answer which might be returned? On the authority of experiments, Dr. Lind assures us, that the blood of such persons, kept in the same state of the air, did not corrupt sooner than that of healthy people. Thin slices of mutton, steeped in its serum, continued sweet, and free from taint, as long as in the serum of blood drawn from persons in health. The secretions from the blood confirm the same idea; for he did not find the urine of people in the scurvy to be more offensive than the urine of persons in health.—Whether I consider, therefore, the nature of the causes producing the scurvy, or the actual state of the blood in the disease, or the secretions

secretions from it in the course of the complaint, they all concur to make me believe, that this disease does not consist in a putridity of the blood. Nor does there appear to be any quality, which can be discerned and defined, in the blood of scorbutic persons, by which the particular nature of their disease can be characterised.

C H A P. V.

*Of certain Properties of the muscular Fibres
of the Body.*

IT being my purpose to examine into the changes produced in the solids, by the remote causes of disorders termed putrid, it may not be improper, first, to give an account of the state and condition of them in health, that we may the better be enabled to judge of the injuries they may sustain, and the alteration they may undergo from disease.

Though the manner in which the various motions of the body are executed, as well as the more intimate structure of its fibres, may be for ever concealed from us ; yet there are certain properties of these taught

us by experiment, the existence and true use of which are as well ascertained as any part of human knowledge. That property of the muscular fibre, by which, on the application of a stimulus, it is enabled to move and to contract itself, is known to be derived from a principle inherent in the fibre, and, to a certain degree, independent even of life. For, though the destruction of this principle in the animal system is certain and immediate death, yet there are many causes which may take away life, and may leave this principle surviving in the muscular fibre; so that when all motion in the machine has ceased, and internal stimuli can be no longer applied, we can, for several days, by external stimuli, excite the muscular fibres to contraction, in consequence of this principle not being yet extinct in them.

But though this property does not always end immediately with life, it begins with it; and it has therefore been
called

called the vital power * (a name which I shall continue to use) and the muscular fibre endowed with it has been termed the moving fibre. The voluntary and involuntary motions of the body are all dependent upon this principle. It is in consequence of it, that the muscular fibres of the heart, being stimulated by the blood flowing into its auricles and ventricles, are made to contract and to propel the blood. The same vital power in the voluntary muscles, being acted upon by the nervous fluid (whatever the nature of this may be) directed to them by the will, renders them obedient to its purposes. The vital power is the efficient cause, whilst the stimuli applied (as for example, the blood flowing into

* Gaubius calls this principle "the vis vitalis," Haller, "the vis insita musculi," from its being an inherent property of the muscular fibre. Haller sometimes denominates this property, "the natura irritabilis musculi, irritabilitas musculi."

the cavities of the heart, in the first instance, and the nervous fluid in the second) are only the exciting causes of muscular motion : for, where the vital power is destroyed, no motion can be excited in the muscular fibre, by any stimulus whatever*.

To treat of the connection of this principle with the vigour and strength of the body, would be to digress too much from the particular subject of these pages. To explain the effects of an increased or undue action of it, would lead to the consideration of that increased tone and contractility of

* Non vi è piu tra i Filosofi, chi ignori che l'irritabilità della fibra è la sorgente, è il principio del moto e della vita, e che a questo principio solo si devono riportare tutti i movimenti sì volontari, che involontari dell' animale. Se questo principio manca, tutto è morto allora nell' animale, e fino è tolta la possibilità alla fibra di più contrarsi. See page 188 of the " *Recherche Philosophique sopra la Fisica Animale di Felicie Fontana.* "

the fibres which takes place in inflammation *. The diseases of which it is my purpose to speak, far from being occasioned by an increased action of the vital power, will be found to be connected with the exactly opposite state of it, with a diminution of the vital power. To the effects of this diminution of it, I shall therefore confine my present attention.

The celebrated philosopher whom we have just now quoted, Fontana †, has examined

* See Dr. Cullen's definition of Tone, in his Physiology, published by Dr. Gregory; and his account of the inflammatory diathesis, in his First Lines of the Practice of Physic. See the Compendium Medicinæ, by de Gorter, chap. 9. vol. 1. where he says, "Aliud genus roboris est, quod consistit in majori contractilitate; si nempe contractio naturalis omnibus fibris major sit quam in corpore sano adesse debet."

† It may be proper in this place to lay before my readers the criterion by which Fontana would have us estimate the vital power of a fibre, as well as the cautions which he seems wisely to recommend to our use in judging of it: — "Tutto questo

mined very attentively the effects of those causes which have a power of impairing the vital principle; and, upon the grounds of extensive

questo mi ha indotto ad esaminare di nuovo quello che era stato pensato sopra le parti più e meno irritabili, ed a rifare nuove esperienze sopra di una materia che pareva già esaurita da tanti osservatori. E se io non erro, mi è parso alla fine che tutta questa materia di parti più e meno irritabili sia piena di equivoci e di fallaci esperienze. Non si è usato quel giusto criterio tanto necessario nel farle, si son confuse le parti le più irritabili con le più irritate, si sono chiamate meno irritabili quelle che si muovevano meno lungamente senza avere alcun riguardo alle accidentali circostanze. Quando si voglia esaminare con rigore la forza dell' irritabilità di un muscolo, e trovare i veri rapporti come si fa di tutte le altre forze della macchina vivente, e calcolar questa nuova forza della fibra animale come si calcolano le altre forze dei corpi, pare che si debba misurare dagli effetti che ne seguono contratto il muscolo e dai pesi che può innalzare. In questo senso che è il più proprio e il più naturale, sarà un muscolo più irritabile d'un altro, se poste le medesime circostanze produrrà un maggiore effetto e leverà un più grand peso."—It had been to be wished,

extensive and judicious experiments, affirms it to be an universal law of the animal œconomy, that the diminution or destruction of the vital power in the muscular fibre, gives it a tendency to putrefaction, and that this tendency will be greater or less in proportion to the force and quickness with which the cause destroying this principle operates. The poison of the viper acts upon this source

that, instead of endeavouring to reform the sense of the word “irritable,” Fontana had changed the term. For people who have generally used it to express a quickness or facility of contraction in the muscular fibre, will with difficulty be brought to annex a different idea to it, however proper it may be. It might prevent confusion, if, for the reasons he assigns, he had said, that in any given circumstance, or with a given stimulus, the vital power of a fibre will be as the force of contraction produced. I shall give many practical instances, in the course of these pages, to evince the justness of this criterion. An attention to the stimuli concerned in producing the various motions of the body, will be shewn to be useful in enabling us to give a consistent account of the convulsions particularly incident to weak people.

of motion in the muscular fibre. The rattlesnake is often known to kill large animals in a minute. Those which die in the shortest time, have always gangrenous appearances round the wound inflicted by the bite. The bodies of such animals as survive a longer period after being bit by the viper, turn black, and have every symptom of approaching mortification. Where the cause is less powerful in its operation, and we have time to note with accuracy all the phenomena which succeed the injury of the vital power, it is observed, that the first effect of the diminution of it, is a weakness of the muscular fibre, so that stimuli, which could have excited it in health to strong contractions, can in this impaired state of its vital power only produce weak ones. A strong shock of electricity *, by diminishing the

* Haller mentions, likewise, these causes among the number of those which destroy the irritability of the fibre. “Ita agit,” says he, “sulphuris vapor et nux

the vital principle, weakens the power of contraction in the muscular fibre; and, if the force of the shock be increased, it will destroy the vital power entirely, and deprive the fibre of all faculty of motion. From being first weak, the fibre becomes soft and flaccid; and animals killed by such means are found to be more tender in twenty-four hours, than when deprived of life by the ordinary means in several days. The muscular fibres in these cases are observed to be lengthened: the particles composing them touch one the other in fewer points, and the cohesion between them is soon destroyed so entirely, that the fibres break upon the least touch, and putrefaction in a very short period ensues.

vomica; ita morsus viperæ; ita electrica vis auctior, qualis est in fulgure, et quæ facit ut cor irritatum nonnisi tremores aliquos cieat, &c.—Vide Alberti Halleri de Partium Corporis Humani præcipuarum Fabricâ et Functionibus Opus.—Tom. ii. p. 407.

I shall

I shall now enquire what are the changes produced in the solids by the causes of the scurvy, and by what evident and discriminating marks such alterations are to be known. I shall examine whether the symptoms of the scurvy be such as denote a diminution of the vital power—whether such a weakness of the muscular fibres, in consequence of it, takes place, as to prevent stimuli, which in health were capable of exciting strong contractions in the voluntary and involuntary muscles, from being able to produce any other than feeble motions? Is this weakness attended with the same consequences, as in the experiments alluded to? Does the muscular fibre in the scurvy become soft and flaccid? Does it lengthen? Is the cohesion between the particles composing it diminished, so that the fibre breaks upon the least touch? and does the putrefaction of the fibre regularly succeed these conditions of it? The slow progress of the scurvy has afforded excellent occasion

for an accurate observation of its symptoms, and if the appearances which occur, and regularly succeed one the other in this disease, should correspond with the phenomena which have been mentioned, it will throw no small light upon the source in the animal œconomy, and the seat of putrid affections in general.

C H A P. VI.

Of the Symptoms of the Scurvy, and the Author's Opinion of its proximate Cause, deduced from them.

BOERHAAVE's Aphorism (1151) contains a very just account of the symptoms of the scurvy in its two first stages, excepting only a single omission, which is supplied by his learned commentator. The picture he has drawn of the two last periods is crowded with many circumstances which have no natural or necessary connection whatever with that complaint. All its real symptoms I shall attempt to explain; and I shall distinguish such as do not properly belong to it. "When the scurvy attacks the Dutch, the Danes, the Swedes, the Britons,

&c. it is generally accompanied," says Boerhaave, "with the following appearances."

1st. "* An unusual slothfulness, a torpor, an aversion to motion, a spontaneous lassitude of the whole body, an heaviness of the same; a pain in all the muscles, such as is felt from too great fatigue, especially in the legs and loins; a very great difficulty in walking, especially up and down hill; on waking in the morning, a sense of fatigue and bruises in all the limbs and muscles." These, says the learned commentator, Van Swieten, are the symptoms of the first stage of the scurvy; which, if they be not cured, are followed by others, which will be successively enumerated.

* *Pigritia insolita, torpor, sedendi et decumbendi amor. Lassitudo spontanea toto corpore. Gravitates ejusdem, Musculorum omnium dolor quasi a nimia fatigatione maxime in cruribus lumbisque. Ambulandi imprimisque per acclive et declive summa difficultas. Mane a somno evigilanti sensus omnium artuum et musculorum quasi fatigantium et contusorum.*

There

There is not one of these symptoms which, by any fair or just interpretation, can be deemed to denote any thing but affections of the moving fibres. The sluggishness, the torpor, &c. shew that the muscular fibre is with more difficulty excited to contract, and that the vital power, upon which the contractions of all muscles depend, must of course be impaired. The aversion to motion, the feebleness of the muscles when brought into action; the inability of persons so affected to support themselves in walking, which requires the aid and action of many muscles, proves that that weakness has actually taken place, which is always attendant on a diminution of the vital power. This impaired state of it is accompanied by some circumstances, which may serve to distinguish it in this particular case. The lassitude or sense of fatigue incident to the scurvy, is different from that which occurs upon other occasions. It is stated to be spontaneous, and in that respect differs from the lassitude following

following labour, which is the necessary effect of an excess of exercise. The lassitude incident to fevers, and attendant upon common colds, is suddenly brought on, and is generally diminished after sleep. But the lassitude of the scorbutic comes on slowly, and increases gradually for days and weeks together. Sleep, which refreshes others, affords no relief to the scorbutic person. In the morning when he rises, he feels the same, and even an increase of that sense of fatigue with which he laid himself down to rest. Another symptom, omitted by Boerhaave, but mentioned by his commentator, is a small, weak, unequal pulse; a circumstance so constant in this complaint, that many authors have considered it as its pathognomic sign. In a more advanced period of the disease, so weak are the contractions of the heart and arteries, that the pulse has well been said by many old writers, *reptare potius quam pulsare*. We see then, that the stimuli, which in health used to excite
strong

strong contractions in the fibres to which they are applied, can now produce only weak ones. Feebleness marks every motion in the muscles subservient to the will; and the blood flowing into the ventricles of the heart, (and more than ordinarily accumulated about it, as I shall hereafter prove) instead of occasioning strong and regular contractions, produces only a small, weak, and an unequal pulse. The exciting causes of the contractions of the fibres therefore continuing to act, and a less effect resulting from their application, the efficient cause of them must necessarily be injured. The vital power, upon which the contractions of all muscles depend, must be impaired. The torpor and weakness of the fibres in this case, put it beyond the possibility of a doubt. These are the first and necessary effects of a diminution of the vital power. The gradual diminution of this principle, by the remote causes which have been related, seems therefore

therefore to constitute the proximate cause in the animal œconomy, from which the torpor, the weakness, and all the subsequent symptoms of the scurvy arise. I say, the diminution of the vital power by the remote causes which have been mentioned ; for if the circumstances of these varied in the slightest degree, the diminution of the vital power would be modified by that difference in them, and the effects and symptoms resulting from it, would not be those of the scurvy, but of another disease, different in its character, though related to it in many particulars, as will hereafter be shown. The justness of this observation may be seen in the effects of a want of sufficient nourishment in different parts of the same country. In the neighbourhood of the Alps, which are covered with a perpetual snow, where cold concurred with a scarcity of provisions, a scurvy was produced ; but during a similar famine in the mild climate of Naples,

petechial

petechial fevers and dry gangrenes were the chief diseases with which the poor inhabitants were afflicted.

The symptoms of the second stage.

2d. * A difficult respiration, and almost a total loss of it on the least motion; a swelling of the legs, which goes and comes; the lower extremities become immoveable from their weight; spots of various colours, red, brown, &c. on different parts of the body: the gums swell; they are painful; they are hot, and have an itching sensation in them;

* *Difficilis, anhelosa, ad motus vel parvos fere deficientis respiratio: crurum tumor accedens recedensque. horum præ gravitate immobilitas: maculæ rubræ, fuscæ, violacæ: faciei color pallido-fuscus. Oris factor incipiens. Gingivæ tumentes, dolentes, calidæ, prurientes, ad minimam pressionem evomentes cruorem. Dentium ob retractas gingivas denudatio et mobilitas. Dolores varii vagi, per omnes externas internasque corporis partes mira producentes tormina pleuritica, stomachica, iliaca, colica, nephritica, cystica, hepatica, lienaria, &c. Hæmorrhagiæ variæ sed leviores.*

they

they bleed on the least touch : the teeth are left bare and become loose, from the gums being pushed back ; various and vague pains in all the external and internal parts of the body, affecting all the different viscera ; many, but slight hæmorrhages.

It is well known, that when the muscles are brought into frequent action by motion, the blood is accelerated to the right ventricle of the heart. With this acceleration, it is requisite that the thorax should be quickly and proportionably expanded, to transmit the blood through the pulmonary artery. *Hæc est ratio, says Van Swieten, quare etiam in sanis hominibus gradus rapidissimè adscendentibus cor palpitare incipiat et respiratio fiat frequentior et molestior quia sanguis venosus tunc tantâ copiâ et celeritate redit ad cor dextrum a toto corpore ut non possit eodem tempore transire per pulmonem nisi celeri respiratione frequentius dilatetur pulmo.* This being
 7 the

the case with persons in health, it is no ways extraordinary, that on any motion of scorbutic people, the respiration should become difficult, and that they should almost lose their breath ; since, by the torpor in their muscles, the chest and the lungs cannot be so easily or so readily dilated to make way for the transmission of the blood. If this difficulty of respiration arose from any vice of the lungs, or any humour oppressing or irritating them, it would be attended with the symptoms usually accompanying such affections. But it is well observed by writers, that no circumstances of that kind occur. The tussis, the sibilus stertor, the dolor pungens, the orthopnœa, et his similia thoracis affectibus propria, are not present. The absence of them proves, that we have, in this case, referred the difficult respiration to its true cause.

“ The swellings of the legs.”—When the tone of the system is diminished, the propulsive powers of the heart and arteries will

will be, in a great degree, overcome by the gravity of the fluids; which will consequently stagnate, and produce swellings in the extremities of the body. But when the effect of the gravity is removed, by an horizontal posture, these swellings, as in the cases of which we are speaking, will disappear.

“The lower extremities become immoveable from their weight.”—The immoveableness of the lower extremities seems to arise from the diminution of the vital power in the muscles; by which means these, which were before easily excited to contract by the nervous influence determined to them by the will, are now no longer capable of motion. The destruction too of that principle, which is usually inherent in the muscles, and which gives a spring and animation to all the fibres of the body, adds to them a seeming increase of weight.

“Spots of various colours, red, brown,
 &c. :

&c. : an offensive breath : the gums swell, and are painful ; they are hot, and have an itching sensation in them ; they bleed on the least touch ; they are left bare.”

The discoloration and spots in various parts, have generally been ascribed to the blood's passing in a putrid dissolved state into the cellular texture under the skin. But, that we have been somewhat mistaken in our account of this matter, seems pretty evident, from the old observation of Poupert. In the bodies of persons who died of this malady, and whose arms, legs, and thighs were tinged with a dark colour, almost black, he found a black coagulated blood under the skin. The contraction in the last stage of this disease, (*contractura*) he informs us, arose from the blood poured out between the interstices of the muscles, and which coagulated so firmly as to give them an uncommon degree of hardness. If the blood had been effused in a putrid dissolved

G
state,

state, it would not probably have been confined to a particular part, nor would the place it occupied have been circumscribed. The impure corrupt fluid would have corroded every thing around it; it would have descended to the most depending part: it could not have coagulated, nor could it have produced an hardness or contraction. But that the effusion, discoloration, spots, &c. arise from the remarkable tenderness, “*teneritudo fibrarum*,” which obtains in consequence of the diminution of the vital power, is proved by many observations. Such is the tender state of the muscular fibre in every part of the body, that a touch in any degree rough will break it, and, producing a *solutio continui*, will permit the vessel to pour out its liquid contents. The weight of the fluids themselves is often sufficient for this effect; and thence arise those frequent, and, in a more advanced period of the complaint, those fatal hæmorrhages. This tenderness,

derness, this diminished cohesion between the particles composing the fibres, is conspicuous in the gums. These first swell; they become lax, flaccid; their attachments to the teeth are easily broken. Hence the gums are pushed back, and the teeth are left bare. The mastication of hard substances is particularly apt to break the fibres of the gums; which, being in those parts much exposed to the air, corrupt and taint the breath. But though this *teneritudo fibrarum* is particularly conspicuous in the gums, it is not confined to them. It is likewise discernible in other parts of the body. Van Swieten relates, that, having handled the wrist of a scorbutic person rather roughly, to feel his pulse, he found the traces of his fingers, the next day, in the discoloration of the skin.

“ Various and vague pains in all the parts of the body, affecting the different viscera.”

—The heart and arteries being so weakened as to be scarcely able to propel the fluids, these will distend the vessels, and produce

pains. Hence it arises, that these pains are most troublesome and acute in those parts, in the abdominal viscera, where the circulation has the least assistance from the action of muscles. The justness of this account is confirmed by the circumstance of the cessation of the pains, when, from the progress of the disease, such a tenderness and diminished cohesion in the fibres is produced, as to admit easily of a solution of the continuity in the vessels, and of an effusion of the contained distending fluids. It has been a general observation, that the pains are always alleviated upon the appearance of the spots.

The symptoms of the third and fourth stages.

“ * A cadaverous putridity of the gums ;
an inflammation and hæmorrhage from the
same ;

3. * *Gingivarum putredo foetens cadaver, harum inflammatio sanguinem stillans, gangræna, Dentium vacillatio. Flavedo. Nigritudo. Caries. Varicosi annuli ad*
raninas

same; a gangrene; loose teeth; a fallow dark complexion; caries; varices, or a destruction of the texture of the venæ raninæ; hæmorrhages, and those often fatal, from

raninas venas. Hæmorrhagiæ sæpe lethales ex ipsâ cute externâ, non apparente vulnere—ex labiis, gingivis, ore, naribus, pulmonibus, stomacho, hepate, liene, pancreate, intestinis, utero, renibus, &c. Ulcera pessima, obstinata nulli applicato cedentia, facile gangrenosa, ubique, maxime in cruribus vagantia cum diuturno fætore. Scabies. Crustæ, sicca et lenis elephantiasis. Sanguis è venis eductus in fibrosâ parte ater, grumofus, crassus et tamen solutus. In parte serosâ falsus, acer, mucosus flavo viridi in superficie scatens. Dolores summi erodentes, lancinantes, citò trajicientes, noctu, ingravescentes per omnes artus, juncturas, ossa, viscera; maculæ lividæ.

4. Febres variæ, calidæ, malignæ intermittentes omni modo. vagæ. periodicæ, continuæ *αποφύαν* inducentes. Vomitus. diarrhæa. dysenteria. stranguriæ sævæ, lipothymia. Anxietates sæpe subito lethales. hydrops. tabes. convulsio. tremor paralysis. contractura. maculæ nigræ. vomitus et secessus sanguinis, hepatis, lienis, pancreatis, meseræi putredo et consumptio, contagium celere.

the skin on the surface of the body, without any appearance of a wound; the same likewise from various other parts, from the lips, the gums, the lungs, the stomach, &c. : ill-conditioned obstinate ulcers, not to be cured by any application, and having a great disposition every where to gangrene; the itch; scabs; a slight degree of the elephantiasis sicca. The blood drawn from the veins is in the fibrous parts, black, grumous, thick, and yet dissolved; in the ferrous part, salt, acrid, having a yellowish green mucus on its surface:—sharp eroding pains, which are transient, but increase at night; livid spots.”

Boerhaave, in his account of the first and second stages of this disease, seems to have been as just and as judicious as he has been fanciful and ill-founded in many of the circumstances which he ascribes to the third and last stages of it. Van Swieten, however, in his usual great reverence for Boerhaave, undertakes, we shall see, to account mechanically

mechanically for all these appearances, not only without enquiring whether they actually did occur, or not, but without considering even whether they were within a possibility of happening.

The symptoms of putridity here mentioned, and the universal tendency to gangrene, &c. are the necessary effects of the cause which has been assigned, and seem to be the phenomena of the last stage in a more advanced state. From the lax flaccid state of the gums, they easily admit of a congestion of blood in them, which gives a redness and an appearance of inflammation. It is no way extraordinary that hæmorrhages should happen at this period, when the cohesion between the particles composing the fibres of the body is so much diminished; but that a fatal hæmorrhage, as stated here, should happen through invisible pores in the skin, “non apparente vulnere,” is no less unwarranted, as far as I have been able to learn, by the history of

the disease, than improbable in itself. A thin ichorous fluid will, in some cases, transude through the relaxed extremities of the vessels ; but that a thick black blood should be pushed through an invifible orifice, in fuch a stream as to prove fatal, is impoffible. Boerhaave is not only ill-grounded in many of the particulars which have been mentioned, his account of the ftate of the blood itfelf is wholly speculative and contradictory. “ The fibrous part is black and grumous ;” the fame part is thick and viscid, thin and diffolved, at the fame time. Thefe conditions or qualities of the blood are contrary to one another, and incompatible. He adds, that the ferum was falt. Dr. Lind tafted the ferum of the blood of fcorbutic perfons, and found that it made as little perceptible impreffion on the tongue as the white of an egg. Independently of this testimony, had the ferum been acrid, nothing would have been fo likely to attenuate the thick vifcidty of the craffamentum, as

the

the saline tenuity of the ferous parts; nor would any thing have been so proper to blunt and sheath the acrimony of the serum, as the thick crassamentum, with which it would have been constantly agitated in the circulation. Thus the vice of one part of the blood would have promised to remedy the depravity of the other; and one should have found it difficult to conceive, on Boerhaave's principles, how any disease could have arisen. But his ideas of the properties of the blood in the scurvy seem to be wholly groundless. They are hypotheses invented to account for the pains, erosions, &c. upon his favourite notion of acrimony; and brought forward at this period, because he did not appear to have any other means of accounting for those symptoms. We are in the next place informed, that ulcers of the worst kind appeared in various parts of the body: from whence could these ulcers arise, but from that weakness which favours congestions in particular parts, and from that

that *teneritudo fibrarum*, which renders the fibres in those parts capable of being easily broken, and of degenerating in this state of the body into foul sores? And yet, in this weak state, in this state of diminished cohesion in the solids, thick blood is said by Boerhaave to be driven through the skin, in a quantity, and with a velocity to produce death, without occasioning a *solutio continui*, (*hæmorrhagiæ sæpe lethales ex ipsâ cute externâ, non apparente vulnere.*) The idea is much too absurd to merit attention. Boerhaave has not only given us here his speculative notions as real occurrences: if any man having the scurvy, happened to be attacked with any other complaint, this was at once set down as one of the symptoms of the disease of which we are speaking. Hence, in the list before us, we see the elephantiasis, malignant fevers, the dysentery, mentioned. The difference between the elephantiasis and scurvy is so well known, as hardly to need to be pointed

pointed out. The former is compatible with the strength of the body. Persons afflicted with it are not hindered from following their accustomed occupations, or their daily labour. The very essence of the scurvy is weakness. People attacked with it sink and faint under the least exertion. A late ingenious traveller * informs us, that the Icelanders, who are very subject to the former, are but rarely afflicted with the latter. There are respectable writers who assert, that persons in the scurvy are less liable to the attack of malignant fevers than others. But should these invade people in the scurvy, as they may happen to do others, they are to be considered as accidental occurrences, and are by no means to be counted in the list of the necessary and essential symptoms of scurvy. The same may be said of the dysentery. Bloody stools, indeed, are frequent in the scurvy, from the dis-

* Dr. Uno Van Troil.

position to hæmorrhage which has been mentioned. But bloody stools alone do not constitute the character of the dysentery. The only symptoms mentioned by Boerhaave in the fourth stage, about which authors, as far as I can learn, are agreed, are, the “strangury, the faintings, the dropsy, convulsions, the tremor and palsy, the contraction.”

It will, I believe, appear no ways extraordinary, that the urine in this disease should be high-coloured, acrid, and sometimes attended with a strangury, when it is recollected that mariners are rarely afflicted with it to a great degree, till they are reduced to a short allowance of small-beer and water. The state and facility of this secretion, we know, depend much on the diluting liquors received into the body.

The anxiety and faintings are occasioned by the oppression of the heart, from those fluids it has no longer strength to propel.

So great is the accumulation of blood about the vital organ, that it has the effect, as has been found on dissection, of distending its cavities to a large size, to the size even of the fist. I have elsewhere shown *, that a weakness of the vital powers is one of the principal causes of the dropfy, an effect which in the case of the scurvy is increased by the obstruction to the circulation from a difficult respiration. It has been observed in every stage of this disease, that great hæmorrhages are apt to occur; and it is well known that great and sudden losses of blood ‡ are frequent causes of convulsions, and they

* V. Animadversiones de Naturâ Hydropis ejusque Curatione.

‡ It may here naturally be asked, and it will be a curious and an important question to resolve, how hæmorrhages should produce convulsions.

It is generally believed by physicians, says Fontana, that convulsions arise from a too great quantity of the nervous fluid, giving excessive irritation to the muscular fibres. But the truth is, that the weakest people

they seem therefore to have been justly deemed by Van Swieten, to be the source of these evils in the present case. Strong, however,

people ordinarily are the most subject to those complaints; nor does it seem probable that a greater quantity of animal spirits should be secreted in the brain of such persons, than in those of people in high health, and who live on the most nourishing food. They who die after great hæmorrhages, women particularly in child-bed, who have suffered great losses of blood, are observed to be subject to strong convulsions, and to have such motions excited as they would be incapable of in health. Animals killed by bleeding are liable to the strongest convulsions; and these are greatest as their strength is less, and their blood is almost entirely discharged. It would be ridiculous, and repugnant to reason, to have recourse to too great quantity, or the too great impetus of the animal spirits, to account for these cases, since there is scarcely any blood or circulation of humours from which they may be secreted, or any strength in the body by which they may be impelled with extraordinary force to excite the contractions of the muscular fibres. The account which Fontana gives of these phenomena, seems to me the most satisfactory of any I have seen, and is the only

however, as are the convulsions occasioned by hæmorrhages in some circumstances, they

one reconcileable to common sense. I shall give it in his own words.

“ Quel giusto equilibrio di forza, e di tensione tra fibra e fibra, e tra muscolo e muscolo, che vi è da fano, e che è mantenuto nel muscolo da quella proporzionata copia d'umori che ordinariamente riceve, manca nella macchina animale ammalata. Ogni muscolo benché rilasciato conserva un certo grado di tensione in tutte le sue fibre, per cui si equilibria con i muscoli antagonisti e rimane così in quiete. Questa verità si dimostra col tagliare per traverso alcune fibre del muscolo, perchè subito queste fibre tagliate si ritirano verso gli estremi fissi e lasciano una larga apertura.

Oltre di ciò si osserva, che se un muscolo diventa paralitico, il suo vicino antagonista subito di per se si accorcia e si contrae e se lo avvicina quantunque le fibre di quest' ultimo non siano stimolate di più del solito da alcun nuovo afflusso di fluido. Ne solamente i fluidi più grossi del corpo animale, ma ancora il fluido nerveo concorrono a far questa tensione nel muscolo e a mantenere le forze motrici dell' animale in un giusto equilibrio. Mancano affatto o in qualche parte questi fluidi

they are rather flight tremors, than strong convulsions, to which the scorbutic are observed

fluidi in quei muscoli convulsi, o vi periscono e scemano irregolarmente, non essendo mai da supporfi una proporzionata uguaglianza di perdita di umori in tante parti, e dove la circolazione è tanto ineguale, e così diminuito con irregolarità il fluido dentro la fibra viene anche levato l'equilibrio tra muscolo e muscolo, tra fibra e fibra equindi i tremori, le convulsioni.

Dal fin qui detto sopra le convulsioni si può cavare la soluzione d'una gran difficoltà fatta da uomini sommi, i quali escludono fino i nervi dal moto dei muscoli, appunto perchè nelle abbondante perdite di sangue si risvegliano nell' animale convulsione tali, che senza quelle perdite eccessive non farebbero mai seguite. In questi casi le convulsioni nascono per l'equilibrio levato tra muscolo e muscolo, perchè il sangue scema allora inegualmente nei diversi canali; laddove questi canali si vuotano con tanto maggior disordine, ed ineguaglianza, quanto le perdite di sangue sono più grandi, e più istantane, non possono si subito con rarsi con quella uguaglianza e armonia naturale, onde le fibre muscolari vengono stirate o premute più o meno e quindi vi si risvegliano straordinarj moti e gagliarde contrazioni. Infatti si vede che le perdite di sangue benchè grandi fatte più

lentamente

served to be subject. They generally faint and die on the least exercise, without any inordinate motion whatever. Sailors afflicted with a great degree of this disease, often expire in an instant, upon being brought upon deck. The vital power, the efficient cause of contraction, being in all these cases diminished, and in some almost

lentamente non cagionano nei muscoli quei moti o non tanto grandi, perchè si dà luogo ai vasi di restringersi egualmente, e agli umori di scorrere per quelli con maggiore uniformità.—Ma che tutti questi moti nascano veramente dal distrutto equilibrio nelle fibre muscolari, apparisce chiaramente da un'esperienza da me fatta più e più volte.—A un dato muscolo, per esempio del collo, attaccato per una parte al cranio, e pendente per l'altra, si può eccitare il moto quando non l'abbia, e accrescerlo quando lo ha, col solo fargli un taglio in guisa, che parte delle sue fibre resti recisa, intatte le altre, in somma facendo in modo che quei fili non fossero più tesi tutti, come prima, e si togliesse in essi il solito equilibrio. E di qui nasce che i muscoli del collo, e d'altre parti si muovono con più forza e per più tempo, quando sono attaccati da ambedue le parti.

destroyed, it is no ways extraordinary, that persons in such situations should die frequently without an effort. The little portion, however, of the vital power remaining, is more likely to be excited by hæmorrhages, than by any other cause.

The paralysis in the scurvy has long been remarked to be of a peculiar kind, and seems to afford a strong instance of that sort of paralysis mentioned by Fontana, as depending on the destruction of the vital power in the muscle, and not upon any injury of the nerve going to it. The scorbutic paralysis has been distinguished from such an affection depending on the nerves by this circumstance, “*quod, licet robur et firmitas pereant membris affectis paralyfi scorbuticâ, tamen in plerisque aliquis motus maneat et quidem per intervalla ille motus augeatur et minuatur denuo.*” The scorbutic paralysis easily gives way to remedies, whereas the paralysis from an injury of the
nerves

nerves is a chronical obstinate complaint, not often cured. Van Swieten himself acquits the nerves of having any share in occasioning the scorbutic paralyfis, and he ascribes it to the destruction of the texture of the muscle itself. From whence does this destroyed texture arise, but from the great diminution of the vital power ordinarily inherent in the muscular fibre itself? * It is not wholly annihilated ;

* “ Possono dunque darsi delle paralisie, specialmente di qualche membro particolare per solo vizio di muscoli, senza che il difetto venga dal fluido nerveo. Ed è poi certo che nelle gran debolezze della machina e in quelle malattie, nelle quali vengono attaccate principalmente le forze dell’ animale in modo che non può più reggersi, e servirsi de’ suoi muscoli, la causa principale è la perdita irritabilita della fibra.—Le Febbri d’Armata, di Carceri, lo Scorbuto, le febbri pestilenziali, l’istessa peste, e tutte le febbri putride sono in questo numero. Nella fibra motrice si fa la gran mutazione per riguardo ai moti dell’ animale, e la meno frequenti e deboli vibrazione del cuore mostrano evidentemente che è attaccato il sistema muscolare ; imperciocchè quel muscolo non riconosce altro stimolo, altra causa del suo

lated; for some little motion remains. This power of motion is occasionally increased. The defect of it is easily and entirely removed by remedies; for which we can only account by the facility with which the vital power is known to restore itself in some diseases, when the obstacles in its way, and the causes diminishing it, are removed.

Contraction.—Contractura.

“In paralyfi,” says Van Swieten, “ade-
rat laxa immobilitas verum in contracturâ
musculi rigidi potius sunt et immobiles
simul.” After having remarked, at the be-
ginning of the sentence, the immobility of
the muscles as arising from their laxity and
destroyed texture, it is singular that a
man of Van Swieten’s abilities should sup-

moto che il sangue venoso il quale seguita a portarsi ai
suoi ventricoli anco in quelle gravi malattie come
prima.” V. Ricerche, Page 52.—The frequency of
the pulse is not in general diminished in putrid fevers;
on the contrary, it is for the most part increased. The
increased frequency, where it takes place, will hereafter
be explained consistently with Fontana’s principles.

pose this laxity changed at once into the opposite state of rigidity, and that he should assert the existence of so visionary a cause, when he himself, on the authority of Poupart, teaches us the only and real source of this contraction and immobility. “Poupartius invenit, says Van Swieten, in cadaveribus musculos inflatos, *duros instar ligni*, ob sanguinem extravasatum inter muscularem carnem hærentem.” In another place, explaining this very symptom, he says, “Observavit hoc malum in scorbuticis Poupart, musculis ligni instar rigescentibus, ob sanguinem copiosum coagulatum quo turgebant.” The distention in size must necessarily produce an abridgement of the length of the muscle, and thus occasion the contraction of the limb to which it is annexed.

A sluggishness, then, a torpor, and a weakness which comes on slowly, and increases gradually, and is marked by a feebleness of action

in all the voluntary muscles, and by a small, weak, unequal pulse, are the first effects of the proximate cause of the scurvy. In the second stage of this complaint, these affections increase. The muscles of the thorax can neither with ease nor with readiness dilate the chest, so that respiration becomes difficult. The voluntary muscles can be no longer commanded. The extremities become immovable. The cohesion between the particles of the muscular fibres is evidently impaired; these lengthen *, they become soft, flaccid, and then so tender that the coats of the vessels break on the least touch, and pour out their liquid contents, which occasion spots under the skin, and various appear-

* Dissections have shewn, that the fibres of the heart have been lengthened, and its ventricles distended to a most enormous and unnatural size. The muscles of the arms and legs have been found by the same means to be quite lax, tender, and inclining to corruption. See Dr. Lind's Postscript to his book on the Scurvy.

ances,

ances. The broken fibres of the gums corrupt and taint the breath, and an universal disposition to gangrene takes place. Fontana shows, that where the force of the muscular fibre is impaired, it is owing to an injury of that property of it, its vital power. He shows, that where the vital power is diminished, or destroyed, it is accompanied with a proportional weakness of the fibre, with a diminished cohesion between its particles, with a lengthening, and a soft lax state of it, and a great tendency to putrefaction. The same affections being conspicuous in the disease of which I am speaking, I think myself warranted in referring them to the same cause, and to conclude, that the scurvy is not a disease of the fluids, but of the solids ; that its seat is in the muscular fibre ; that its proximate cause consists in a gradual diminution of the vital power by the remote causes of this disease ; that the torpor, weakness, &c. observed in all the functions, are the first effects of the proximate cause, the diminution of the vital

H 4 power ;

power ; and that the subsequent diminished cohesion between the particles of the muscular fibres, and the tendency of these to putrefaction, are links of the chain, and are ultimately derived from the same source.

This view of the subject may lead us to an explanation of many occurrences in the history of the scurvy, which, if it were seen in any other light, might not be of so easy solution. If we consider the remote causes of this disease separately, we shall perceive, that whilst they have a direct relation and connection with the vital power, the properties of most of them, so far from immediately conveying any putridity to the fluids of the body, are themselves in their nature antiseptic. The impaired state of the vital power is the most striking feature in the constitution of persons predisposed to this complaint. It is the diminution of this principle which constitutes the weakness in the fibres of persons just recovered from acute diseases : moderate cold braces, but
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the excessive cold of Greenland, and other places, which predisposes to the scurvy, though antiseptic in its properties, yet is extremely inimical to the moving powers of the machine. It benumbs those faculties, and has been known so entirely to destroy the vital power, as to bring on sudden gangrene and death. A sudden check of perspiration has generally stimulant effects; but whether that stimulant operation be continued by the slow and gradual suppression of it which takes place in the scurvy, and persons are predisposed to this disease by the vital power being thereby diminished and exhausted, (an effect which long-continued stimuli will have;) or whether the slow and gradual suppression of that evacuation, when its almost vicarious secretion by the kidneys, from the deficiency of drinks, is considerably lessened, occasions the retention of impure particles, which by their weakening or sedative qualities may impair the vital power, may admit of much discussion.

sion. The languor in all the functions of persons in the hypochondriasis, and the torpor of the moving fibres in sorrowful affections of the mind, bespeak some injury of the vital power. Though the most acute observer would find it difficult to point out any common quality in the fluids of the various persons predisposed to the scurvy, which should incline them to it, yet the predisposing causes have all of them a tendency, more or less, to impair the vital power.

But if an injury of this principle is to be traced in the state of predisposition to this complaint, how much more strongly marked is the tendency of its occasional causes to diminish that source of motion in our bodies? If we should refer this complaint to a peculiar taint of the fluids, it would be difficult to conceive how it could be derived from matters of such opposite properties as animal and vegetable substances ; from matters so opposite in their natures, as the salt-diet of sailors, and the
farinaceous

farinaceous puddings of the Bohemians. But when, agreeably to the idea of Dr. Lind, we consider that salt-provisions tend to excite the scurvy, not by their saline, but by their indigestible nature; and that the glutinous pudding, just mentioned, oppresses the stomach as much as salted meats; our difficulties are much lessened. For all indigestible substances, whatever their chemical properties may be, wear the force of the body. By diminishing the vital principle, they induce a languor on all its functions. A want of sufficient nourishment must have a similar operation. A weakness of the fibres, the necessary and immediate offspring of an injury of their vital power, is its first effect; a general disposition to putridity its regular consequence. That this disposition to putridity results from a diminution of the vital power, and not from a putrid ferment acting upon the blood, is proved by many circumstances. A putridity could not be communicated to
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the blood of the poor Italians by the decoctions of the vegetable roots which they used ; nor to that of the poor women whose cases are related in the Medical Transactions of the College *, by the infusion of tea which they drank. Such liquids, it should seem, were well calculated to wash off any impurities from the fluids, and to discharge them by the emunctories ; or should they remain, (if the doctrine of antiseptics were true) we might with reason expect these infusions, as powerful antiseptics, to correct such impurities, and to render them innocent. But, not having a sufficient quantity of nutritious matter in them to repair the daily waste of the machine, the vital power,

* In a paper which I had many years since the honour of transmitting to the College, I adopted Sir J. Pringle's idea of a gradually - accumulated putrefaction ; but a reference to those who have examined the actual state of the blood in the scurvy, has taught me the groundlessness of such a notion.

and the force of the fibre, must necessarily decline, and the general disposition to putridity take place. Supposing, however, either in the case of a want of sufficient nourishment, or in that of a slow and gradual suppression of perspiration, at a time when, from a deficiency of drinks, the secretion from the kidneys cannot have been properly promoted; supposing, I say, impure particles to be retained in the body, and to be received into the circulation, (a circumstance in either situation which appears to me highly probable) they are not sufficient to be discernible in the mass; they do not sensibly, in the scurvy, alter the mixture of the blood. Far from being warranted to say, that such impurities produce the disease by assimilating the blood to their own putrid natures, we may be justified in asserting the contrary: for the blood in the last stage of the complaint, and even when it has occasioned death, is not in the putrid state which
has

has been ascribed to it at the beginning, and which has been said to constitute the proximate cause from which all its symptoms have been derived. When such impurities, therefore, find their way into the circulation, they must, I should conceive, act like the other occasional causes, and impair the vital principle by their weakening, or sedative qualities. Sudden fear is one of the causes which excites the scurvy the most readily; but can it at once convert the blood into an acrid or a putrid state? Though it would be impossible to account for its operation in this way, yet the near relation * which subsists between the animal and vital powers of the body is matter of old remark, and

* *Animalis etiam vis, quæ sensus regit, cum vi vitali communicat et vehementer affecta huic pro irritamento esse potest ut hæc vicissim illi. Quocirca, et mentem hominis isti commercio implicitam esse constat. Gaubii Pathol. p. 75.*

presents us with an easy and a natural solution of it. It is a known fact, that such affections of the mind are constantly followed by a diminution of the vital power; the weak slow pulse, and languor in all the motions of the body attendant upon them, prove it. We may live on a salt-diet for years: its juices may be mixed with our blood for a long period without mischief. If the vital power be not diminished, and a torpor and weakness produced, the scurvy will have no existence. The experienced Dr. Lind assures us, that he has known messes, as they are called, of seamen, who have lived for the space of three years on the ship's provisions, for want of money to purchase better fare, and especially greens, and yet have kept free from the scurvy. All these circumstances tend to explode the idea of this disease, being constituted by a gradually-accumulated putrefaction from such a food, and to corroborate the opinion

I have

I have delivered relative to its proximate cause. A little further research into the history of putrid diseases may tend, perhaps, to add confirmation to the doctrine I have advanced.

C H A P. VII.

Of the general Character of putrid Fevers.

DOCTOR Cullen gives the following concise character of the Typhus (the genus of fevers under which he ranks the various species of those commonly termed putrid); * that it is a contagious disease, in which the heat of the body is very little increased; the pulse is small and weak, but, for the most part, frequent; the urine undergoes very little change: but the functions of the brain are extremely deranged, and the strength of the body is much diminished.

* G. V. Typhus.

Morbus contagiosus; calor parum auctus; pulsus parvus, debilis, plerumque frequens; urina parum mutata; sensorii functiones plurimum turbatae; vires multum imminutæ.

C H A P. VIII.

Of the predisposing Causes of putrid Fevers.

WITH respect to the remote causes of fevers in general, we are but little informed: but, imperfect as our knowledge is, experience has taught us, that persons in some situations are more susceptible of epidemic contagions, and of putrid fevers, than others in different circumstances. People who inhabit damp houses, or who live in modes of uncleanness, are particularly liable to them. The plague is often prevalent in those parts of Constantinople where the people are constantly employed in washing linen, and the Jews, in the same city, from their inattention to cleanliness, are ravaged by it, at a time when others suffer
but

but little from its virulence. An indigestible diet, or intemperance in eating, fatigue, and every cause which depresses the force of the body, renders people very susceptible of epidemic complaints. Fear, and all the debilitating affections of the mind, give a rapidity to the progress of contagion. Persons exposed, during sleep, to noxious effluvia from marshes, are particularly apt to suffer from their influence. A stranger going to pass the night in the neighbourhood of Rome, at a certain season of the year, is almost sure to be attacked with the putrid fever of that country.—These are the principal conditions under which the human body is observed to be predisposed to putrid fevers.

C H A P. IX.

Of the occasional or exciting Causes of putrid Fevers, and of the Means of defeating their Operation.

THE chief exciting cause of these complaints, is contagion; under which term I would include all sorts of matter occasioning putrid fevers *, as well that active poison, which is generated by unclean persons in prisons, or confined places, as those noxious effluvia which arise from low, marshy, unwholesome grounds. As the specific nature of all such matters is entirely unknown to us, and as experience has not yet taught us

* V. Typhus gravior of Dr. Cullen.

any antidote by which we can disarm them of their virulence, the prevention of the diseases, which they are apt to occasion, must depend principally upon our correction of that state of our body by which we are predisposed to them, and upon our avoiding, as much as possible, the exciting causes, at that time especially when we feel ourselves under the influence of any of the predisposing ones. — Cleanliness cannot therefore be too much attended to. In hospitals, and in jails, on board ship, and in every situation where a number of people are crowded into a small space, authority should be employed to enforce it. Intemperance, both in eating and drinking, should be carefully avoided during the prevalence of a putrid epidemic disease. The French physicians have assured us, that the most certain preservative against the plague which appeared at Marseilles, was temperance, and the use of food of easy digestion. But whilst excess of every kind is to be shunned, and

moderation in our diet is to be strictly observed, we should likewise be cautious not to run into the opposite extreme of too great abstinence. *Æque cavendum esse a crapulâ atque ab inediâ*, is advice which we derive from high authority. I have remarked, that every thing tending to weaken the powers of the animal machine, which too long fasting is apt to do, renders the body susceptible of impressions from morbid causes which it otherwise might not feel. The slight diminution of force * in the action of the vital powers during sleep, is probably the

* Hippocrates (Lib. de Flatibus) observes, *ὅταν γὰρ ἐπέλθῃ τῷ σώματι ὁ ὕπνος, τότε τὸ αἷμα ψύχεται. φύσει γὰρ πεφυκεν ὁ ὕπνος ψυχεῖν. Ψυχθέντος δὲ τοῦ αἵματος, κωδρότεραι γίνονται αἱ διεξοδοί.* Lancisi translates this passage, and adds a commentary to illustrate it. *Quum somnus corpus invaserit, sanguis frigitur; a naturâ enim somno frigefaciendi (hoc est minùs movendi) vis est. Infrigidato autem sanguine, languidiores fiunt ejus meatus. — Hoc autem languore efficitur, ut, irrumpentibus undequaque malignis effluviis, patentiores sint aditus et propulsandi facultas imbecillior.*

circumstance

circumstance which renders it so dangerous to people, unaccustomed to such an air, to pass the night in the neighbourhood of Rome. We should therefore not only studiously avoid every enfeebling power, but endeavour to correct that slight sense of weakness, which too long fasting is apt to give. Lancisi, with this view, recommended it to every one at Rome, never to go out of a morning at an unhealthy period with an empty stomach, but to eat a piece of bread soaked in wine, or some other thing to strengthen that organ. The use in Italy, as well as in Sicily, of iced liquors, is said to have been attended with the most beneficial consequences. Plempius * relates, that the plague, or (we should

* Refert Plempius, “ post usum nivis vino refrigerando inventum rarius quam solebat pestilentiam Siciliae regnum invadere: quod confirmari ait a Balthassare Pisanello qui tradit diligenti observatione exploratum esse in urbe Messanâ quotannis mille numero pauciores quam ante usum nivis interire. V. Lancisi opera, tom. iii. p. 172.

rather say, putrid fevers have been much less frequent in Sicily since the custom of icing their liquors has prevailed: and another physician, upon the authority of a diligent enquiry, assured him, that the deaths in one city only had been fewer by a thousand annually since the introduction of that practice. In unhealthy seasons, the physicians who have practised in Hungary have commended the Peruvian bark as a preservative: but I profess, unless it be under the circumstance of a predisposing state of great weakness from a previous illness (which was generally the case when the bark proved so advantageous in Hungary) I should rather be inclined to reserve such a remedy for other and more urgent purposes, being in general disposed to think, that medicines are more calculated to relieve in the exigency of disease, than to be useful as the auxiliaries of health.—It was probably owing to their regular mode of living, to their avoiding that weakness which intemperance

or improper food is apt to give, that the committee of thirteen physicians, who were appointed by the empress of Russia to attend those ill of the plague at Moscow, in 1771, for the most part escaped the disease *. Their freedom from that fear with which the common people are generally impressed during the prevalence of such a complaint, may have contributed somewhat, perhaps, likewise, to their exemption. They used no other precaution than to avoid touching the person, the cloaths, and the beds of their patients.

* In solam plebem, ut semper accidit, sæviit pestis. Inter nobiles et ditiores mercatores, neminem fere, præter paucos valde incautos, invasit. Solo ægrorum et rerum infectarum contactu communicabatur, atque atmosphæra contagium non spargebat; sed sanissima semper fuit. Visitando tam propè adstabamus illis ut sola pedis distantia inter nos et eos sæpe vix remaneret, et absque aliâ quacunque cautelâ, quam quod nec corpus neque vestes aut lectum tangeremus a peste immunes permanimus. Linguam, proprius observando, solebam

patients. Dr. Mærtens, indeed, when he approached very near them, to look at their tongues, used to stuff a piece of cloth, dipped in vinegar, up his nostrils : and he inferred from the good fortune of himself and his brethren in escaping the plague, that the infection of it could only be communicated by the contact of the cloaths or persons of the diseased ; and that it could not be received by the conveyance of the air. Contact of the cloaths or persons of the infected, is doubtless the most certain and most frequent means of communicating the contagion, and should therefore be avoided

solebam linteum aceto communi imbutum naribus et ori admove. V. Mærtens *Historia Pestis Moscuensis*, anni 1771. — It is no ways extraordinary, that the common people should be particularly apt to suffer from this calamity ; they are most liable to its prædisposing causes. A bad diet, an irregular mode of living, a want of cleanliness, exposure to fatigue, to the vicissitudes of heat and cold, are almost inseparable from their condition. They too have less power of avoiding to touch those things which may be supposed to convey the infection.

with the most studious care. But it does not seem, from Dr. Mærtens's own account, to be the only one. It does not appear, as far as I can see, that his friend Dr. Pogaretschy had infringed the rule of avoiding to touch the cloaths or persons of the sick ; and yet he had a slight attack of the disease. But however this may be with respect to the plague, it is certain that other contagious putrid diseases may be communicated otherwise than by the contact of the infected persons. People not within reach of the prisoners at Oxford, were attacked with the gaol-fever before they left the court of assize ; and that source of putrid diseases, the noxious effluvia from marshes, can have no other vehicle than the air to apply them to our bodies. Our means, therefore, to prevent putrid fevers, consist in opposing and correcting their predisposing causes. It was to these objects that the ancient physicians with great wisdom directed their attention. The advice of Celsus contains
nearly

nearly every thing which can at present be said upon this subject. “ Vitare oportet,” says he, “ fatigationem, cruditatem, frigus, calorem, libidinem: tam neque mane surgendum, neque pedibus nudis ambulandum, minimèque post cibum. Cum vero hæc in omni pestilentia facienda sint, tum in eâ maximè quam austri excitarint *.”

Some of the more modern physicians, however, not content with inculcating the observance of these rules, flatter themselves with the idea of possessing remedies against the exciting causes of putrid fevers. They have conceived themselves to have discovered antidotes capable of correcting or changing the contagious or poisonous matters, or of defending the body against any taint or impression from them. Silvius pretended not only to have been preserved from the infection of the plague for a long time

* This refers to the putrid fevers which were excited by noxious effluvia from marshes.

by the vegetable acids, but to have been once freed from a weight and pain in his head, which he imagined to have been the consequence of an actual attack of the disease. Diemerbroeck recommends the smoking tobacco. During the prevalence of the plague, he made daily use of his pipe, and escaped the distemper. A learned gentleman of our country, Sir J. Pringle, observes, that the plague, pestilential fevers, and putrid scurvies, &c. have abated in Europe, during this last century ; a blessing which he ascribes to our improvement in every thing relating to cleanliness, and to the general use of antiseptics. He says, that hopped beer, wine, and vinous liquors coming more into general use, have been some means of suppressing putrid diseases ; that greens and fruits are more universally eaten, and salted meats make a less part of our diet than formerly. To this he adds the more general use of tea and sugar, which being, according to his experiments, considerable

siderable antiseptics, concur to produce the same effects. We know that epidemical diseases vary extremely, both in their number and in their natures, at different periods ; but there are no principles, I am apt to believe, which will enable us to account for such differences. Acidulated drinks are both agreeable and beneficial. Vegetables are very wholesome ingredients in our diet. The former cool the body, the latter are succulent, they promote the solution of our food, they are prone to ferment, they facilitate the digestion of it. By the use of such things, we may doubtless be the less apt to be predisposed to putrid fevers ; but that the articles which have been mentioned have a power, by any antiseptic or other effect, of disarming the occasional causes of such complaints, or of defending our bodies against their impressions, is contradicted by the experience of every country. The Turks suffer exceedingly from the plague,

plague, though they are in the constant use of the vegetable acids in their sherbet. At Marfeilles, those who could afford to make use of vinegar in every way, who had pails full of it standing constantly at their doors, with which they purified every thing which was brought to them, did not escape the plague more than their neighbours, who had no such advantages. In the southern parts of France and Italy, putrid fevers of various descriptions are very frequent ; and though the lower sort of people live chiefly, if not wholly, on vegetable food during summer and autumn ; though acid wines be their constant drink ; yet at these periods, they are more visited by such fevers than at other times. It may be said, perhaps, that the heat of these countries exalts the virulence of contagion—that it favours the production of noxious effluvia. I am very ready to admit it. But with the bane, is not the antidote produced in proportional abundance ?

abundance? If vegetables, If acid wines, &c. as antiseptics, had any power of counteracting these poisons, either by changing their natures, or by impregnating the body with any qualities to enable it to resist their impressions, the inhabitants of the countries just mentioned should be wholly exempt from the calamities they occasion. But unfortunately for them, and for such doctrines, the fact is quite otherwise. Experience seems also to contradict the advice of Diemerbroeck. Smoking tobacco to correct the humidity of the air in a moist climate, may tend to prevent a predisposition to some fevers; but it affords no defence against an epidemical infection. The Turks smoke more tobacco than other people, and yet they suffer the most from the plague. When this distemper broke out at Moscow in 1771, the Russians had great reliance on smoking for protection from it; but the event showed upon what

fallacious grounds they had placed their security ; for in that single city twenty-seven thousand persons were carried off by the disease, in the month of September only.

C H A P. X.

Of certain Opinions which have been maintained with respect to the Nature of the proximate Cause of Putrid Fevers.

TH E occasional causes of putrid fevers arising from impure sources, generated possibly by unclean persons in confined places, or proceeding, as has been said, from low marshy grounds, have themselves been presumed for that reason to be putrid*, and to produce the several

* There seems to be some reason to doubt the strict justness of this inference. It should be remembered that the volatile alkali, an antiseptic, is itself the off-

ral diseases arising from them, by assimilating the blood to their own impure corrupt natures. Before I enter upon the examination of this point, I cannot but express my regret, that, notwithstanding the continual allusions, in medical writings, to the doctrine of ferments, physicians have not explained, with the precision that could be

spring of putrefaction. Dr. Alexander's ingenious experiments tend to show, that the effluvia from marshes are antiseptic. To be noxious, is it necessary that they should be putrid? or, being putrid, would they necessarily be productive of putrid diseases? (See Dr. Alexander's Arguments.)—Ramazzini (*de Morbis Artificum*) acquaints us that they were inflammations of the eyes, and not putrid fevers, to which persons employed in cleaning the common-sewers were liable. Is it in their progress to putrefaction, and not when putridity has actually taken place, that putrescent bodies are apt to give out unwholesome vapours? The precise time of their generation, as well as the specific nature of contagious matters, and of noxious effluvia, seem to be much concealed from us.

wished, the manner in which they act, or the limits to which their operation is confined in the animal œconomy. Any contagious matter lodged in the cellular texture, or other similar situation, will ferment, and assimilate the surrounding humours to its own nature. Under these circumstances, that degree of rest obtains, which is known to be requisite to every fermentative process. But how different is the condition of this matter, when it passes into the circulation? There, so far from remaining in a relative state of rest, or in contact with any particular portion of the blood, it is as constantly changing its place with respect to the particles of that fluid, as these are with respect to each other. Hence, in diseases arising from any specific matter, though the noxious particles may be absorbed, and floating in the blood, by stimulating, or weakening, may produce effects on the vital power suitable to their properties, the mixture of the vital fluid is not much affected.

Its sensible qualities are not changed. The blood in the small-pox, or in the hectic fever from an abscess of the lungs or other parts, will be inflamed in proportion to the fever excited, but it will derive no peculiar complexion from the particular matter occasioning that fever.

Contagious matters, it is well known, are very different in their natures. Some stimulate, as that of the small-pox; others, as those which produce putrid fevers, are weakening, or sedative; but that these are so in consequence of their putridity, I am neither disposed to assert, or to deny, being unable to offer positive proof of either position. Their subtlety eludes examination, and renders us as incapable of pronouncing upon their condition, as upon the manner in which they are applied to our bodies to impair our health. I have no objection to agree so far with the common notion, which is so confidently asserted of their putridity, as to suppose it to be the case. I have no objection

to suppose that these noxious contagious matters, which we will for the present call putrid matters, make their way into the circulation. But the question is, whether, having thus got admittance into the vital stream, they there act as ferments, and assimilate the blood to their own corrupt natures, or whether they produce their mischief by an action on the vital power, without affecting the sensible qualities of that fluid. This is a point of consequence to decide ; because, if the latter be the case, to prevent the evils they tend to occasion, we should endeavour to evacuate the offending matters, or to defend that principle of our system against their impression. And that their operation is upon the vital power, seems extremely probable, not only from the advantage of obviating the predisposing causes, and of strengthening the system in general, but likewise from the benefit which has been experienced, (where the occasional causes have been with good reason suspected to have actually

tually invaded people) from emetics, laxatives, and gentle sudorifics. But if the operation of these contagious matters be upon the blood, and if the doctrine of antiseptics be well founded, we should have nothing to fear from dispensing with such troublesome discipline. By pouring into the body a quantity of antiseptics, we should crush the serpent in the egg. We should thereby change the corrupt nature of the exciting causes into a sound state, or we should at least guard the pure state of our fluids from receiving a taint from them. We have already seen how contrary such an expectation would be to experience.

I have sufficiently shown, that the occasional causes of putrid fevers are, in fact, noxious matters, for which we find no antidotes in antiseptics. They who think highly of the virtues of these medicines, may perhaps from hence be led to doubt the putridity of the occasional causes, as they might conceive, that had they been of that nature,

antiseptics would prove a better security to us against them. Others, who may have less faith in the preservative and corrective qualities of such articles in the animal œconomy, may still think the occasional causes not acquitted of putridity by the inefficacy of antiseptics to guard us against them. Instead of reasoning, they may bid us examine into the actual state of the blood, and of the secretions from it, in putrid fevers. They may ask, Have not the occasional causes corrupted and dissolved the former? Doth not the state of the latter mark the corruption of the fountain from which they spring? I have already maintained the incompatibility of a putrid state of the blood, for a moment, with animal life: but though there may be very few persons who would contradict this general assertion, as being too evident to admit of a doubt, yet there are few explanations of particular diseases which do not seem to proceed upon the contrary supposition. A putridity of the blood
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and humours is continually introduced by writers, to account for symptoms which, without the assistance of that notion, they would have been at a loss to solve. People are not easily weaned from an inveterate prejudice by a general proposition. They require particular refutation; which I shall endeavour to furnish in the cases before us, and shall be glad to join issue upon the grounds which have been proposed. And first, with respect to the secretions:—Dr. Cullen observes, that one of the generic marks of the Typhus or putrid fever is, that the urine is but little changed. Where the stream is so little tainted or altered, one should conceive that the source from which it flowed could not be very corrupt; and it should seem to be no rash conclusion, to infer, from the instance of this secretion, that the blood from which the urine is derived could not be in a putrid state. But let us examine the blood itself in some particular species of this complaint.

In

In the most malignant of putrid fevers, is the vital fluid actually depraved in the manner in which it has been represented, or not? Does the most virulent and most powerful of the contagions, that of the plague, for instance, convert the blood into a state of corruption and dissolution? Venesection has been performed in malignant putrid fevers, and in the plague itself. And what has been the state of the blood drawn? It has been as various in these as in other diseases; sometimes coagulating firmly, at others but little disposed to do so; and, I believe, no candid person will pretend, in any of the cases, to be able to point out the cause of the difference. Sydenham bled a person ill of the fever which he calls the *Febris pestilentialis*, and which he describes as accompanied with unusual symptoms of uncommon malignity. So firmly did this person's blood coagulate, that he compares it to that drawn from one in a pleurisy. It is well known, that when the plague began to spread

spread in London, Sydenham retired into the country; but returning to town when the prevalence of it was on the decline, he had an opportunity of attending some people ill of it. He bled one person three times who was known to have that disease; and he compares the blood in this case, likewise, to that drawn from a person in a pleurisy *. Many observations of the same kind might, if necessary, be adduced. The essential nature, then, of the malignant pestilential fever, and that of the plague, the proximate cause of the symptoms of the one and of the other, does not consist in a putridity of the blood. Its coagulation in the instances which have been mentioned, refutes every idea of that sort. Had it been putrid and dissolved, it could not have coagulated. But though a putridity of the blood may not be the proximate cause of the plague,

* *Necnon sanguinem ipsius in acetabulis refrigeratum ei qui a pleuriticis detrahitur non absimilem fuisse.*

let us pursue our enquiry a little further; let us examine whether such a state of the vital fluid be constantly, necessarily, and essentially connected with the disease, either as cause or effect. Sydenham, who was prevented by the friends of his patient ill of the plague from opening a vein a fourth time, ascribes his death (which happened the day following the last operation) to that omission, alledging that a fourth bleeding would have discharged the whole materia morbi, some of which remaining, he conceived, must have destroyed the texture of the blood, and thereby occasioned death. The first part of the observation he has given us, he could not be deceived in. The coagulation of the blood was an object of mere sight. The latter part of it, with respect to the imaginary effect of the remaining materia morbi in dissolving the blood, was a speculative inference, for which he does not appear to have had any foundation. He thought, as many others have
done,

done, that it must be so broken down, because he could not otherwise account for the livid spots which were seen, and which I shall trace to a more certain source. Sydenham could not speak from knowledge of the state of his patient's blood after the third time of bleeding. He did not open him, to examine into the state of it, after the speedy death which ensued. He, who at an early period fled from the rumour of the prevalence of the disease, was not a person to expose himself to such fearful risks. The French physicians at Marseilles had more courage or less apprehension. They dissected the bodies of a great number of persons who died of the plague. The report they made of the state of the bodies, which is recorded, is no way equivocal *. It is a pointed contradiction of the commonly-received

* V. *Traité des causes, des accidens, et de la cure de la Peste, avec un recueil d'observations et un detail circonstancié des precautions qu'on a prises pour sub-*
venir

ceived notions of the putridity of the blood. The enlarged size of the heart, and the perfect coagulation of the blood in its cavities, were the constant appearances which they remarked. After a particular recital of the state of the several bodies, “ we have not,” say they, “ opened the bodies of any persons who have died of the plague, without finding the four cavities of the heart extremely full, and distended with a thick black blood entirely coagulated. Tout grumelé, caillé, coagulé, are the various terms which they at different times make use of to express the state of the blood *. From
hence

venir aux besoins des peuples affligés de cette maladie ou pour la prevenir dans des lieux qui en sont menacés. Fait et imprimé par ordre du Roi. a Paris. Quarto.

* Nous n'avons ouvert aucun cadavre de pestiferés ou nous n'ayons toujours trouvé les quatre cavitez du cœur extrêmement remplies et dilatées par un sang epais, noir et tout grumelé. Le cœur du Sieur Bourget avoit si fort grossi, qu'il fut trouvé crevé audevant de son ventricule droit, du cote du septum medium, sur lequel

hence they were led to believe, that a too great thickness of the blood was, in part at least, the cause of this disease. It then appears, that at the moment the most virulent of these contagions, the contagion of the plague, has consummated its mischief, and produced death, the blood is not in the putrid dissolved state which has been ascribed to it at the beginning of the disease, and from which all the evil was supposed to have derived its origin.

Let us now recollect the general symptoms, mentioned by Dr. Cullen, of the putrid fever, and let us consider to what conclusion, with respect to its proximate cause, they will lead us. These are, “ a trifling increase of heat in the

lequel nous trouvames la valeur d'une livre de sang tout caillé, qui s'étant fait jour par la dite déchirure, s'étoit extravasé sur ce viscere dans la cavité du pericarde. Le foye s'est toujours trouvé engorgé de sang et beaucoup plus gros que dans l'état naturel. *Traité de la Peste, part i. p. 201.*

body ;

body ; a small, weak, but for the most part frequent pulse ; the urine but little changed ; the functions of the brain much disordered ; and the strength of the body greatly diminished." These generic marks, with others, are seen in every species * of this disease. † Debility, languor, a sudden and excessive decay of strength, a weakness without any remarkable

* See the Typhus gravior or the more malignant putrid fever of Dr. Cullen. Under this species of the putrid fever he includes the jail-fever, the camp-fever, &c. He makes the plague a genus of the exanthemata. But whatever propriety there may be, on account of the buboes incident to it, in the place he has allotted to it in his Nosologia, the definition the learned professor himself gives of it, justifies me in considering it here as a species of the malignant putrid fever. He defines the Pestis, "Typhus maximè contagiosa cum summâ debilitate."

† Sic virium debilitas, languor, prostratio, pulsûs sine insigni celeritate imbecillitas, temulentia æmula capitis hebetudo, dolor, gravitas, stupor, vertigo, oculorum vigor a se ipso alienus, linguæ flacciditas, tremor,

remarkable quickness of the pulse, an heaviness of the head resembling a state of drunkenness, a stupor, a vertigo, a dullness of the eyes, a flaccidity of the tongue, a tremor of the same with an incapacity to articulate, with many other symptoms, occur, says Chenot, more frequently, more quickly, and with greater violence, at the first attack of the plague, than in any of the ordinary diseases of this class. From these circumstances, and from the absence of every mark of any depravation or corruption of the humours, he infers, in a very vague manner, that the contagion of the plague must act upon the nerves. But nothing can more fully show how inaccurate his notions upon this subject were, than his bringing arguments in the same paragraph to prove the

mor, balbuties, materiæ æruginosæ rejectio; urinæ pallor, aliaque plura tam frequenter, cito, multipliciter, violenter in nulla vulgarium morborum specie occurrunt, quemadmodum in peste. Chenot Tract. de Peste, p. 41.

opinion of the ancients, that the plague was a disease of the heart, and that the sudden lassitude, and weakness of the pulse, with a slowness of it in some cases, proved the great injury which that organ had sustained. From these particulars it appears, that he was certain only of one thing, viz. that the pestilential contagion did not act upon the blood. The symptoms which he relates, I shall endeavour to explain hereafter. The French writers seem to agree in referring its operation to the vital power: “ *Le caractère general de ce venin,*” says one of them, “ *c’est d’attaquer l’esprit vital ou ce principe qui donne le mouvement aux ressorts qui soutiennent la vie. Delà viennent que le pouls s’éteint, &c.*” Besides these general affections, together with livid spots in various parts of the body, buboes and carbuncles soon follow, and seem particularly to characterize the plague. All these appearances are the occurrences of a few days. Death sometimes, indeed, ensues in less than eight-
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and-forty hours. The general symptoms which have been mentioned, the languor and lassitude, the excessive weakness in all the motions of the body, and particularly conspicuous in the functions of the heart, appear as suddenly, almost as violently perhaps, in other putrid fevers as in the plague. In the gaol-fever which happened at Oxford, persons were attacked with the disease before they left the court of assize. In this, as in other putrid malignant fevers, livid spots, petechiæ, appear in the space of a few days. If these are not accompanied with buboes, depositions on the parotid glands and other parts are not unfrequently attendant upon them. In all these fevers there is a singular disposition to gangrene. In the plague the carbuncles *, we are informed, are gangrenous affections, not critical depositions. In other putrid fevers, gangrenous ulcers, seen particularly in the throat, are very frequent.

* See Mærtens Historia Pestis Moscuensis, ann. 1771.

—How then are we to explain all these appearances? What do the symptoms denote? All those general ones first mentioned prove, that the vital power, that power, *quâ fibra ad contactum irritamenti se contrahit*, is diminished in every part of the machine. It is with difficulty that the voluntary muscles can be excited to motion; and they are feeble when brought into action. The sick persons can hardly walk or stand; so weak are the contractions of the muscles of the tongue as, instead of distinct articulation, to occasion the speech to falter. That blood, which flowing into the cavities of the heart used to excite strong and regular contractions, can now only produce weak ones. In the plague, the pulse is in a manner extinguished, as a French writer expresses it. In other malignant putrid fevers, it is sometimes slow, more often quick. But, if the “*pulsus plerumque frequens* *” be a just

* See the *Nosologia Methodica* of Dr. Cullen.

part of the character of putrid fevers, must we not say, that, however the vital power may have suffered in the voluntary muscles, so far from being impaired, it is increased in the heart? This would be to suppose, that what diminishes it in one muscle, may increase it in another; this would be to make the quickness and frequency of its contractions the measure of the vital power in its fibres. He who should calculate it by such means, without paying any regard either to the stimuli applied to excite the contractions of the heart, or to the force and effect of these when produced, seems to me to be as little likely to form a just estimate of the vital power in the fibres, which perform them, as that person would be of having an accurate idea of the momentum or force of a moving body, who, without considering the quantity of the matter it contains, should measure it merely by its velocity.—To draw right conclusions therefore from the quickness of the pulse, we must examine the sources from which it

may arise. As the vital power seems in these cases to be generally diminished in the machine, it does not appear any way probable that it should have suffered no local injury in the fibres of the heart. Instead of proceeding therefore from increased irritability, may not the quickness of the pulse be occasioned by increased irritation? A minute investigation of this matter will, I am apt to believe, teach us, that, instead of being more irritable, the vital organ will only appear to have been more irritated. But, that I may not appear to make assertions without proofs, I shall endeavour to point out the source of this increased irritation; nor shall I have recourse for this purpose to any irritating qualities combined with the sedative ones of the poisons which excite putrid fevers, the operation of which might be supposed to take place after the effects of the latter have ceased. Averse to every thing like hypothesis, I shall search for the solution of this matter in such causes as are
evident

evident and demonstrable. I shall look for it in the mechanical increase of stimulus which takes place in these cases, and which it may be easy to observe, and not difficult perhaps to explain. It is generally, I believe, admitted, that the blood flowing into the four cavities of the heart, is the stimulus which excites them to contract; and the effect, we shall find, will always be proportioned to the degree of the cause applied. When, at the beginning of the paroxysm of an intermittent fever, a spasm and paleness appear on the surface of the body, and the blood is suddenly repelled to the internal parts, the pulse becomes during the cold fit very small, extremely frequent, and often irregular. The heart seems for a while to labour under the load which oppresses it; but, the vital power in its fibres being oppressed, and not essentially impaired, this accumulation of the blood about the heart soon rouses it to strong and powerful contractions, by which the blood is propelled

with force to the extremities, and all the symptoms of the hot fit, the heat and the redness of the skin, &c. ensue. As the heat comes on, the heart having freed itself in some degree, the pulse becomes more regular, hard, and full, and in these respects increases until the sweat breaks out *. As the sweat flows, and as the circulation becomes equable in every part, and the heart is no longer stimulated by an unusual quantity of blood driven back upon it, the pulse becomes softer and less frequent. But in fevers termed putrid, the vital power being greatly diminished, and the actions depending upon it considerably weakened, the heart is unable to rid itself of the blood accumulated about it, which in that unusual quantity irritates it, as in the cold fit of an intermittent, to small and very frequent contractions. In these cases, instead of that heat and glowing redness of the skin which

* See Dr. Cullen's First Lines of Practice:

is conspicuous after the cold fit, when the heart seems to have been only oppressed by the extraordinary load thrown upon it, the same spasm with little or no relaxation, the same paleness continues, the same ghastly countenance is seen throughout the course of the disease, and consequently the same cause which originally repelled the blood from the surface still operates. But, independently of all reasoning, the distention of the cavities of the heart discovered on dissection, and their having burst * in some instances, evince to a demonstration, that the blood has been unduly accumulated about it in putrid fevers, and that the vital organ has of course been unusually irritated. But the continued repulsion of the blood is not the only source of extraordinary irritation in these cases. A resistance to the motion of the heart has likewise been reckoned by physiologists among the causes which quicken

* Vide *Traité des Causes*, &c. quoted before.

the pulse: the obstinate spasm on the surface of the body, independently of the repulsion of the blood consequent upon it, may perhaps in this way contribute to that effect. But the extraordinary heaviness and weight of the muscular parts in putrid diseases, from the diminution of the vital principle which gives a spring and animation to them, must form a great obstacle to the propulsive powers of the heart, and to the propagation of the motion of the blood. The blood, then, accumulated about the heart, the spasm, and the increased weight of the muscles giving resistance to its motion, are sources of uncommon irritation. So much, however, by some of the occasional causes which excite malignant fevers, is the vital power destroyed, that the concurrence of all these causes is not in some cases able to quicken the pulse. In the plague, and in other malignant putrid fevers, physicians have observed it not only to be weak, but in many instances to be likewise slow. For
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which reason, the accurate Dr. Cullen, in his character of the Typhus, does not represent the pulse to be always quick, but only “*plerumque frequens.*” And when this increased frequency does occur, that it arises from the causes I have mentioned, is evident from this circumstance, that if by tonic and stimulant medicines we can rouse the heart to rid itself of the accumulated load upon it, and the abatement of the spasm will admit of its being propelled in any degree to the surface of the body, the pulse becomes more full and less frequent. But, independently of these suggestions, had I not been able to point out these sources of uncommon irritation, the making the quickness of the pulse, in such cases, the criterion of an increase of irritability in the heart, would involve us in the grossest contradictions. Our principles in that case, and our practice, would be at the greatest variance. Where the vital power is not impaired, where the vital power, or
irritability

irritability as it is called, is in the ordinary state of health, stimuli are extremely pernicious ; how much more then must they be so, where that principle is increased ? But so far are they from being hurtful in putrid diseases, that persons ill of them, and unaccustomed to wine, will not only bear, but require, a quantity of cordials which at other times would expose them to the most dangerous inflammations. To restore the contractions of the heart to their healthy standard, we are obliged to assist its weakness by an increase of tonic stimuli, to excite it to a due performance of its functions. Or, to adopt the common language which has been used upon this occasion, we find it necessary to support by every possible means the sinking *vis vitæ*, or vital power : With what propriety, then, could we refer the quickness of the pulse to an increase of that principle which we find it so necessary to support, and to keep as much as possible from constantly diminishing?

The late celebrated Haller, who passes one general sentence of putridity upon all the exciting causes of putrid fevers, without appearing to alledge sufficient proofs of it, agrees with me in regard to their primary effect on the system, which he admits to be “*summa virium et irritabilis naturæ destructio* ;” but then he adds, “*cum simili suæ causæ in humoribus nostris putredine conjuncta*.” It seems extraordinary, that so able a philosopher as Haller should have conceived, that the occasional causes would act directly by their sedative or weakening qualities in diminishing the vital principle, and that they should at the same time operate as a ferment upon the fluids, and assimilate them to their own natures ; since this would be a needless multiplication of causes, and no ways consonant to the simple mode in which the wisdom of nature usually accomplishes her ends. The quickness with which the occasional causes of putrid fevers affect us, discountenances every idea of their act-
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ing as ferments, which require time to produce a change upon our humours, and to assimilate our fluids to their own natures; and the notion is shown to be groundless by the proofs I have already adduced that the blood is not found after death to be so corrupted as it has been represented to be during life. Haller then agrees with me in observing, that the first effect upon our bodies of the occasional causes of putrid fevers, is to destroy the vital power and the strength of the system. Hence then, as I have said before, arises that difficulty, which persons under their influence feel to use their muscles, hence that aversion to motion, and weakness in every action. The contractions of the heart are feeble. If they are quick, it is because the causes stimulating that organ are greatly increased. As the impaired state of the vital power seems to offer so natural and so just a solution of the diminution of force in all the voluntary and involuntary motions, so it appears to me that
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it would be extremely unphilosophical to have recourse to any other cause, and much less to a visionary putridity of the blood, to account for that flaccidity conspicuous in all the fibres of the body, for the livid spots, for the tendency to gangrene, so remarkable in all these diseases. They are all derived from the same common origin, they are all links of the same chain. All these appearances are analogous to those observed by the celebrated Italian philosopher, when the vital power was purposely and artificially destroyed. Weakness was its first consequence; a soft, flaccid, tender state of the muscular fibres, a diminished cohesion between the particles composing them, a lengthening of the fibres, followed in succession, and were the immediate forerunners of putrefaction. The progress to putrefaction, in putrid diseases, is marked by the same occurrences, and I therefore seem to be justified in referring them to the same source. In the scurvy, and in putrid fevers, a torpor, a diminished disposition

disposition to contract, and a diminished force of contraction, are the first effects of their occasional causes. In the former, as well as in the latter, the same soft flaccid state of the muscular fibres occurs ; the same diminished cohesion between the particles composing them, by which the vessels readily suffer those fluids, which they could before retain, to be effused under the skin, and to give the spots common to all these cases. Hence too that aptitude to discharge blood by the various emunctories. The same lengthening of the fibres is likewise discovered. In the scurvy, and in the plague, the heart has been found distended to a large size. And the tendency to gangrene and putrefaction is remarkable in both these morbid affections. But the time in which the symptoms of these diseases come on, and the quickness with which their several phenomena succeed one the other, seem to be proportioned in some degree to the violence and the suddenness with which the vital power

power in each complaint is diminished. In the plague, that principle is greatly and quickly injured, and the livid spots, and the carbuncles, frequently arise in eight-and-forty hours. The whole disease is often the tragedy only of a few days. In other malignant fevers, in the gaol-fever, &c. the livid spots are seen the third day. In the scurvy, where the vital principle is slowly and gradually impaired, it is many weeks before the spots appear. As these spots follow the injury sustained by the vital power, and are either quick or slow in their appearance, just as this principle is either quickly or slowly diminished, we have as much reason to think them the effect of the impaired state of the vital power, as to consider the hot fit of an ague the natural consequence of the cold fit. Does the early disorder of the functions of the brain, in putrid fevers, arise from the injury of the vital power inherent in the fibres of the vessels which go to it? or, is it not rather the effect of that quick

change in the circulation consequent on the weakness of the heart and arteries, by which the force and the quantity of the blood propelled to that organ are suddenly lessened, and the equability of the distribution of the vital fluid to the different parts of it, is quickly and greatly disturbed? Does not the absence of any considerable disorder of the functions of the brain in the scurvy countenance this idea? In this case, does not the gradual subtraction of force from the heart and arteries, give time to the vessels of the brain to accommodate themselves to the change which takes place in the circulation? When no particular disease has taken place, it is certainly owing to this cause, that a very considerable quantity of blood may be discharged slowly from the body without affecting the head: but a much less quantity drawn off by venæsection will often produce faintness.

If we consider the appearances indicating a disposition to putrefaction in a particular

cular part, they will be found to correspond with and to confirm what we have advanced with respect to the source of a similar tendency in the general system. Let us view the phenomena which attend the first decline of the vital principle (whatever it may be that impairs it) from its most exalted state in an inflamed part, to its total extinction in a gangrene. The inflamed part first changes from a clear to a dark red ; its fibres become soft and flaccid, and though before extremely irritable, they are now almost insensible to stimuli. The colour of the part then becomes livid, and by degrees quite black. The heat of the part ceases. The softness and flaccidity of the fibres increase. Their cohesion goes on diminishing, till they lose their consistence entirely. They at last exhale a cadaverous smell, and moulder away *. Dr. Cullen is of opinion, that the violent excitement of the inflammation gives a tendency to gan-

* See Dr. Cullen's First Lines.

grene by first destroying the tone of the vessels, and therefore an extreme violence of pain in an inflamed part always makes us apprehensive of it. We do not appear to know what the precise situation of the particles of a fibre with respect to each other is, upon which the due action of the vital power inherent in it depends, nor in what manner that particular state is changed by an excessive inflammation. Whether the great irritation which occasioned the inflammation exhausts this principle, as continued stimuli are known to do, or whether the excessively increased action in the inflamed part deranges the situation of the particles of its fibres which is necessary to the action of the vital power, cannot be determined. It is certain, however, that gangrene is often the consequence of such an high inflammation, as well as of those greatly sedative causes which prevail in malignant fevers. Much, however, as these excit-

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ing causes * of gangrene differ, their effects are the same. The symptoms common to all of them (the change of colour, the diminished irritability from stimuli, the diminished tone, the diminished cohesion, the soft flaccid state of the fibres, &c.) prove that the gangrenes, in both cases, proceed from the same proximate cause in the system, and that whether the vital power be impaired by an high inflammation, or by sedative causes, the destruction of it is the immediate source in the animal œconomy, from which all the phenomena I have mentioned are derived.

* Our success in preventing and in stopping gangrenes, will always depend upon our sagacity in discovering the nature of the cause which excites them. It will easily be conceived, that one occasioned by an high inflammation, will require a very different mode of treatment from that which is brought on by sedative causes and great weakness. Those from the latter source are the most frequent in their occurrence.

The histories of some cases were lately read at a meeting of the Royal Society, tending to prove that mortifications were more local affections than had commonly been imagined. Whilst it would be difficult to conceive this truth, were they derived from any general vice of our circulating humours, the principles I have laid down will enable us to account for it. It is well known, that the vital power of a particular part may be injured, and a tendency to putrefaction in consequence take place, and yet the circulating fluids may not be tainted. Mortification, and the loss of a limb, has often been the effect of intense cold, which has no power of communicating any septic principles to the mass of the blood. With respect to putrid diseases likewise, which are not confined to a particular part, but affect the whole body, though they cannot be referred to a putridity of the circulating mass of our humours, as being that which must produce instant death, yet a diminution of

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the vital power, giving weakness, &c. and a tendency to putrefaction in the whole system, is compatible with life, though not with health, and presents us with the only means, as it appears to me, by which a reasonable solution can be offered of the phenomena of putrid diseases.

We may venture, I think, to conclude, from what has preceded, that the muscular fibres are the seat of putrid diseases—that the diminution of the vital power inherent in those fibres is the proximate cause, is the general and immediate source in the animal œconomy, from which their symptoms arise—that the similitude and affinity which has been remarked between certain appearances attending all putrid diseases, (as the livid spots, the flaccidity of the fibres, &c.) are owing to their occupying the same seat, and to their being derived from the same origin in the system—and that the peculiarities which have been observed to occur in the various species of

those diseases, may probably arise from the different manner in which their several remote causes may affect the vital power, the injury of which is the immediate parent of all their symptoms.

I shall conclude this chapter with contrasting a slight sketch of those morbid affections which result from an increased action of the vital power, with the general character of such as depend upon a diminution of it.

The former gives inflammation, which is to be distinguished by an increased tone and contractility of the fibres of the body; the latter, a disposition to putridity, marked by a diminished tone, and a diminished contractility of them. The former is accompanied with a great force of vibration in the vessels, and an hardness of the pulse; an extreme degree of weakness of the pulse marks the latter constitution, with which strength and hardness are wholly incompatible. The state of inflammation is attended with a
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great increase of heat; the putrid tendency with very little. The former gives a glowing redness to the body; great paleness is the companion of the latter. In an inflamed condition of the body, the tense state of its fibres is conspicuous, and which will be especially discernible, when the increased action of the vital power takes place in a particular part; in the putrid disposition, the lax flaccid state of the fibres is equally evident. The former is to be removed by those things which lessen the action of the vital power; the latter, it will be seen, is to be remedied by those which increase it. In the former case, the action of the vital power is to be lowered to the standard of health; in the latter, it is to be raised to it. In inflammation, evacuations to lessen the quantity of the blood and humours which excite the contractions of the heart and arteries, and refrigerant medicines to abate their inordinate actions, are necessary; in the
 putrid

putrid affection, cordial and tonic medicines, to support the sinking vital power, and to restore the diminished action of the vessels to its usual vigour and force of contraction, are requisite.

C H A P. XI.

Of the Origin of the Scurvy.

IT has been matter of much discussion and controversy, whether the scurvy be a disease with which the ancient physicians were acquainted, or whether it be the production of later times, and the offspring of certain modes of living peculiar to the present and a few preceding ages. The affirmative part of this question, “that the scurvy was both known to and described by the ancients,” has been maintained by the most distinguished persons for their learning, from Sennertus to Dr. Mead. The authority of Dr. Friend seems to be the chief support of the negative side of this argument.

argument. So much and so ably has this dispute been handled, that I could have wished not to have entered upon a part of my subject, in which I shall frequently be involved in the unavoidable repetition of what others have said; but it seems to be highly improper to decline touching upon it in this place, because it may be of consequence to the doctrine I have advanced, to prove, that, as some of the causes to which I have referred the scurvy are such as may at times prevail in almost every country; so, in fact, it has, at some period or other, been found to exist in most parts of the globe. In the examination of this matter, I shall not barely consider the words of the ancient physicians, which have been understood to relate to this complaint, but I shall enquire, whether the diseases, the descriptions of which have been thought to agree with those of the scurvy, were observed to arise from those causes which are known at present to occasion this malady.

In the Græcian, in the Arabian, and in the Roman authors, we shall find many accounts and passages, which cannot be deemed to refer to any other complaint, than to that of which we are speaking. Hippocrates describes the σπλην μέγας in the following manner: “ Alius lienis morbus ab iisdem quidem ex quibus et prior oritur eoque modo hoc morbo afficitur. Venter inflatur, postea vero lien intumescit, durus est eique dolores acuti contingunt: color immutatur et niger cernitur, sub-pallidus et qui malicorium formâ referat, et aure et gingivis gravis odor exhalat eæque a dentibus diffusionem faciunt, et in tibiis ulcera qualia pustulæ nocturnæ erumpunt, membra extenuantur neque stercus per alvum demittitur*.” Similar symptoms are, in other parts of the works of Hippocrates, said to follow like affections of the spleen †.—The same

* V. Lib. Hipp. de internis Affect.

† V. Hipp. Oper. Lib. ii. Prædict.

observations have likewise been made by other writers. Paulus Ægineta remarks, “Hoc pressis vitio (schirrho lienis) os fætet, gingivæ exeduntur, ulcera in cruribus cicatricem non recipiunt.” The terms in which Avicenna speaks of this disease, have some marks which seem to shew that he did not servilely borrow or copy his account of it from others: “Et quandoque denigratur lingua eâ duritie splenis, et sentitur durities ejus absque rugitu cum premitur, nisi aggregetur ei inflatio, et non est cum eâ febris inseparabilis, imo aliquando est non secundum ordinem: et quandoque multiplicantur cum ea ulcera crurum, et corroduntur dentes, ac gingivæ propter grossitudinem sanguinis, qui descendit in ulcera crurum, et corruptionem vaporis qui descendit in omnes partes gingivarum, et quandoque est in ulceribus crurum crisis ejus.” The constitutions in which this disease, called by the ancients σπλην μέγας, was observed to occur, were those which had been weakened

weakened by preceding diseases, by obstinate and ill-cured fevers, or in atrabiliary habits. It was said, likewise, to arise in cold weather from drinking impure waters. The atrabiliary habit, and weakness after fevers, are at this time observed to contribute to the production of the scurvy, and seem to afford a presumption, that the disease, called the σπλην μέγας by the physicians which have been quoted, was no other than the scurvy.

The description, however, of the *Convolutus sanguineus* * is still more agreeable to that of the scurvy, than that even of the σπλην μέγας. One attacked with that disease is said by Hippocrates to be attended with the following symptoms: “ Ex ore malus odor expirat, a dentibus gingivæ abscedunt et ex naribus sanguis effluit. Interdum verò ex cruribus ulcera erumpunt. Et hæc quidem fanescunt—alia vero exori-

* Είδος αἱματίτης.

untur. Color niger est et cutis tenuis. Ad deambulationem et ad laborem (haud) promptus est.” After the example of Haller, I have taken the liberty to add the negative “ haud ” to this description ; since most writers have considered the omission of the negative *s* in the Greek text as an accidental corruption of it. For, whatever the disease here described may be deemed, it is inconsistent with common sense to suppose, that they who had ulcers, &c. in their legs, could be alert to labour and exercise ; which would be the sense of the passage, if the negative article be not restored. But a part of the text itself proves that Hippocrates could not mean to say, that persons afflicted with the *Convulvulus sanguineus*, were ad deambulationem et ad laborem prompti ; since he says, *cætera quidem copia eadem ac prioribus contingunt*. Of the persons mentioned in the preceding passage, as labouring under the first species of the *Convulvulus*, it is

said,

said, Ejus autem crura gravantur, et si deambulet tremunt, et si per acclivem locum iter faciat crebro admodum spirat et ulnæ suspensæ esse videntur, &c.

Stating the passage in this manner, it must be allowed by every one to be a perfect description of the scurvy, excepting that the spots, frequently incident to this disease, are not mentioned. But, if the spots be not the term made use of, the discoloration of the skin is constantly noticed. In this place it is said, color niger est, cutis tenuis: when Hippocrates speaks of the *σπλην μεγάς*, it is said, color autem immutatur et niger cernitur, subpallidus, &c. In like manner Sennertus, one of the best writers on the scurvy, observes, “ In aliquibus nullæ erumpunt maculæ; aliis tota crura colore violaceo pinguntur ut tibi alia ejus coloris super-inducta jurares.” The description of Hippocrates is perfectly agreeable to the last instance of the scurvy mentioned by Sennertus.

When I consider the mildness of the cli-

mate in which the works of Hippocrates were composed, and the consequent rare occurrence of this disease, both from that circumstance as well as from the impossibility of long voyages by means of the ignorance of navigation in those times ; when I recollect too the general inaccuracy (resulting from the state of physic at that period) in the characters of diseases much more familiar to the ancients than the scurvy could possibly have been ; I profess, I am more struck with surprize at the description being so perfect, than disposed to cavil with its trifling defects. — If from the description we turn to the consideration of the generic cause of the various kinds of Convolvuli, our doubts of its being scurvy which is here meant to be delineated, must be still more lessened. It was an heating food, taken by persons using little or no exercise, and who, thus weakened, were suddenly forced to undertake long and fatiguing journies in very cold weather.

weather. Convolvuli appellantur hi morbi ex hisque præcipue oriuntur. Si quis calidâ et humidâ victûs ratione per hyemem utatur neque ciborum ratione factâ obambulationibus se exerceat, verum expletus dormiat, deinde derepente longum iter per frigus conficere cogatur. The name given to it in this place, is equally corroborative of my opinion with the generic cause assigned. The *Ελæος* is a term not confined by the ancients to express affections of the smaller intestines, but applied to denote pains in the other parts of the abdomen likewise. The modern term Schorbock, or Schorbuck, in the Saxon language, signifies nothing more than pains of the bowels. Dr. Mead, de Scorbuto, says, *Tormina quoque ventrem discruciant. Et ne levia quidem prætermittam, ab intestinorum doloribus nomen suum tum Latinum tum Anglicum traxisse videtur iste affectus a voce nimirum Saxonica Scherbock vel Schorbuck quæ illâ linguâ ventris lacerationes denotat.*

The description then, the generic cause, the name of the disease, in this last instance, all lead to the same conclusion.

But if the diseases mentioned by the ancients under the names of the *Splen magnus*, and the *Convolvulus sanguineus*, &c. be not the scurvy, it would be difficult, I believe, to say, to what other complaint the descriptions of them are applicable. That they were real pictures drawn from nature, and not set down by whim or fancy, I believe no one will deny. Let us suppose a modern physician called to a person labouring under the symptoms ascribed to the *Convolvulus sanguineus*. Let us suppose that he found his patient with a most offensive breath, the gums receding from the teeth, and these left bare, accompanied with frequent hæmorrhages from the nose, and little foul ulcers in the legs, with a dark discoloured skin, and withal a great degree of general debility. A physician would probably enquire into the circumstances of the person's mode of living,
previous

previous to this illness; the patient would tell him, that he had lived for a considerable time on a very heating diet, indulging always in the greatest indolence, and that in this weak enervated state, having been obliged to undertake a long fatiguing journey, much beyond his strength, in extremely cold weather, he had been attacked with the symptoms which have been mentioned. I believe there is hardly a physician who, under these circumstances, would hesitate to pronounce his disease to be the scurvy.

Strabo informs us, that the Roman army sent into Arabia, under Ælius Gallus, in the reign of Augustus, underwent great hardships and fatigue from difficult marches, at some times in a marshy unhealthy country, and at other times from long and troublesome navigations, which Syllæus purposely protracted. “Proinde,” says he, “ad album pagum pervenit, jam exercitu oris et crurum vitiis (qui morbi sunt ei regioni peculiares) tacto Stomacacen et Sceletyrben dicunt: quorum illa

circa os et circa crura resolutio quædam est ex aquis et herbis proveniens*.” As the scurvy in Italy arose from a scarcity of corn and provisions, and from the inhabitants being reduced to live on a decoction of vegetable roots, it is reasonable to suppose that the same effects must follow from the same causes among other people, and that in the Roman army it was produced, as it has been among others, not by any peculiar quality of the herbs which were eaten, but from the small and insufficient nourishment which these afforded. In the particular case of the Romans, which we have mentioned, this is not the mere inference of reason. We have the express assurance of the historian, that the Roman army had been purposely and treacherously exposed to hardships, and almost famine, by Syllæus: *Nam nec tutum iter, says he, nec expeditam navigationem monstravit sed per avia et longos anfractus et loca*

* Vide Strabonis, lib. 16, p. 1127.

omnium *indiga* et importuosa dorfa vel occultis cautibus aut cænosis stagnis periculosa duxit. We are moreover assured that Syllæus had premeditated their destruction, and wished to accomplish it by fatigue and famine. Is (scil. Syllæus) omnia dolo agebat, cupiens ut opinor regionem perlustrare et Romanis in urbibus aliquot ac gentibus subigendis adesse, deinde his absumptis morbo, fame †, labore, et aliis quæ struxerat malis ipse universa ea possidere. It was under circumstances somewhat similar, that the disease arose, which afflicted the Christian army in

† Τετρε (Συλλαίς) δ' ἅπαντα δόλῳ στρατηγούντος, καὶ ζητούντος (ὡς οἶμαι) κατοπτευσαι μὲν τὴν χώραν, καὶ συνεξελεῖν τινὰς αὐτῶν πόλεις καὶ ἔθνη μετὰ τῶν Ῥωμαίων, αὐτὸν δὲ καταστῆναι κύριον ἀπαντῶν, ἀφανισθευτῶν ἐκείνων ὑπὸ λιμῆ καὶ κόπῃ, καὶ νοσῶν καὶ ἄλλων ὅσα δόλῳ παρεσκευασεν ἐκεῖνος· εἰς γὰρ τὴν λευκὴν κωμὴν κατῆγεν, ἥδη σομακάκη τε καὶ σκελοτυρβη πειραζομένης τῆς στρατῆας ἐπιχωρίοις παθεσι, τῶν μὲν περὶ τὸ σομα, τῶν δὲ περὶ τὰ σκελὴ παραλυσίᾳ τινὰ δηλοῦντων, ἐκ τε τῶν υδρείων, καὶ τῶν βοτάνων.

Egypt, under St. Louis, in 1260. They had great difficulty to subsist themselves. They had but one sort of fish, and their religion would not suffer them to eat meat during Lent*. That circumstance, together with the bad air, and the great scarcity of water,

* Nous ne mangions nulz poissons en l'ost tout le quaresme mez que bourbetes, et les bourbetes manjoient les gens mors, pource que ce sont glous poissons: et pour ce meschief et pour l'enfermeté du pays, là ou il ne pleut nulle foiz goutte d'yaue, nous vint la maladie de l'ost, qui estoit tele que la char de nos jambes sechoit toute et le cuir de nos jambes devenoient tavelès de noir et de terre, aussi comme une vielz heuse; et a nous qui avions tele maladie venoit char pourrie es gencives, ne nulz eschapoit de cette maladie que mourir ne l'en convenist. La signe de la mort estoit tel que là ou le nez seignoît, il convenoit mourir.—The arrival of Easter did not put an end to the calamities of this army. For the dearnefs of provisions precluded them in a great measure from the plentiful use of that food which their condition so much required. Joinville informs us, that an ox sold for eighty livres, an hog for thirty, an egg for twelve deniers, an hoghead of wine for ten livres; all very great prices for those times.

gave them a most virulent scurvy, which is characterized in the most particular manner by the Sieur Joinville, who is unanimously admitted by every one to have given a perfect description of the disease. It is therefore somewhat extraordinary, that a man of Dr. Friend's erudition, should consider the scurvy as a new disease, and the offspring of the fifteenth century, and that he should venture to differ from so many of his learned predecessors in the profession, merely on the authority of such a writer as Fabricius, (for he gives no other reason); who tells us, in his Antiquities of his own country, Misnia, that in 1486 this new and unheard-of disease spread itself very much, and not only proved extremely dangerous, but carried contagion with it *. The words of Fabricius are, "grassatus est hoc anno novus et

* See Dr. Friend's History of Physic, vol. II. page 387.

inauditus in his terris morbus †." This then is only to say, that it was a new and unheard-of disease in Misnia. But if Fabricius and others had not till this time any knowledge of the scurvy, either from books or from experience, it only proves their ignorance of Joinville's history of St. Louis, of Strabo, and of the Arabian as well as the Græcian writers. It is indeed no ways extraordinary that they should be unacquainted with the works of such authors : since learning was but just then beginning to revive ; and Dr. Friend himself admits, that very few had consulted the works of the ancient Greek and Arabian physicians, till the end of the fifteenth century. It is no objection to the point I wish to establish, that the ancients, to whom, for the reasons which have been given, the scurvy must have been much less familiar than to us, should have called it by

† Vide Tractatum Johannis A Bona de Scorbuto. He discusses this subject with great erudition.

different names, the Splen magnus, the Convulvulus fanguineus, the Stomacace, &c. and perhaps have considered the complaints so denominated as different diseases. Modern writers have given it various appellations, according to the particular symptom which struck them as predominant. The Danes have called it Scorbeck, from the gums and teeth being affected. The Saxons, Scorboct, from the pains in the bowels which attend this disease. But the difference of the name does not alter the nature of the complaint; and though most of the northern nations had peculiar terms for it, they doubtless meant to denote one and the same thing by all of them. The disease described by Joinville, is not less the scurvy for not being called by that name. The term Scurvy, which is now prevalent, was thought so barbarous, that after it had been applied to this disease, and the word Scorbutus added to the Latin language, Ronseus and others declined to use it, and entitled their books, written professedly

fessedly on the scurvy, “ De magnis Lienibus Hippocratis et Plinii Stomacace, seu sic dicto Scorbuto, et Sceletyrbe.” It seems, therefore, that I may be justified in concluding that the ancients were acquainted with the scurvy. They observed its connection with those constitutions to which it is known at this time to be related. They teach us that the atrabiliary habit, and weakness from long and ill-cured fevers, gave people a predisposition to the Splen magnus, and that crude cold waters contributed likewise to the same disease. The exposure of persons who had lived in habits of indolence, to great and sudden fatigue in cold weather, inclined persons to the various species of the Convolvuli. Great fatigue, with a want of sufficient sustenance, occasioned the Stomacace and the Sceletyrbe in the Roman army. The same circumstances, together with a moist impure air, involved the French army under St. Louis in the same calamities. As the descriptions of the diseases in all these cases,

cases, and the causes which produced them, correspond very much with the known character of the scurvy, and with the sources from which it is now observed to arise, I cannot but believe that the diseases delineated by the ancient writers, in the passages which have been quoted, were no other than that now known by the general appellation of the scurvy.

C H A P. XII.

Of the Cure of the Scurvy and putrid Fevers.

TH E R E are surely few diseases which have so many and such excellent remedies as the Scurvy ; and it has been observed, with good reason, that there is scarcely any complaint in which the transition from the most deplorable state to that of health, is frequently so sudden, and often seemingly brought about by the most trifling means. I shall briefly mention, not only the medicines which have been most approved in this disorder, but the means which have been found efficacious in the removal of it without their assistance ; and I shall subjoin some observations on the mode in which, I conceive, the health, in both cases, may have been restored.

Fruits,

Fruits, and those vegetables called *Herbæ*, are especially beneficial. Of the former, the orange and the lemon are of particular efficacy; but their juices should be diluted with warm water or gruel, or, which would be still better, four ounces of these juices should be added to a pint of wine, with two ounces of sugar. This, the experienced Dr. Lind esteems the most efficacious remedy for this disease, and greatly to exceed the simple lemon-juice, or any other method in which it can be given. This mixture, he acquaints us, proves greatly diuretic, and sometimes occasions profuse sweats.

Among the vegetables, though all those of the succulent kind, as the spinage, common greens, &c. are extremely serviceable, yet the scurvy-grass and the water-creffes are particularly eminent for their virtues. All the aromatic, as well as the alcalescent plants, have received an high and a just degree of praise in these cases. The juice of the cocoa-nut tree, which distills from incisions

incisions made in the branches and tops of it, has been known to produce effects equal to any medicine. The Peruvian bark, too, is spoken of by many authors as being of remarkable use in some cases of the scurvy. Hoffman speaks in high terms of the mineral waters as excellent remedies for it. Among others, he praises the Caroline and the Seltzer waters ; but he thinks the mineral waters are more efficacious when they partake of the chalybeate principle, as the waters of the Lanchstadt spring near Hall. The happy discoveries of Dr. Priestley have taught us a method by which this remedy, so much applauded by Hoffman, may be within the reach of every vessel. The mode of sweetening salt-water by distillation is, I suppose, known to every commander. If such water should prove vapid and unpalatable, fixed air would not only help to correct such a taste, and be a beneficial addition on account of its active stimulant properties ; but it might be of further

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ther service, by putting it in our power to conform still more to Hoffman's advice, and, by the addition of some steel-filings, which fixed air would enable the water to dissolve, to bring our medicine still nearer to the nature of the Lanchstadt spring.

But though the greatest merit cannot be refused to the medicines which have been mentioned, there are other, and seemingly trifling means, by which a recovery from this disease has been frequently effected. The change of the situation of seamen from the moisture of a ship to a pure air and a dry tent on shore, has produced a wonderful amendment. Fresh flesh-broths have often worked a perfect cure. On the 30th of January, 1744, Mr. Ives informs us, that he had near seventy persons ill of the scurvy in the Mediterranean ; yet the joy of approaching the enemy's fleet, and the hope of beating them, had such an effect, that on the 11th of February following, when the engagement happened, there were not above

five but what were at their fighting quarters. They had had but five servings or messes of broth during this time; and Dr. Lind seems, with reason, to consider this sudden and wonderful change, rather as an instance of the effect of the passions of the mind in this disease, than as the consequence of the very trifling assistance they could have derived from their broths. The same respectable author, in the Postscript to his Book on the Scurvy, gives us the sum of his experience during a long period; in which he had, perhaps, the best opportunities of making observations which ever occurred to any individual. As I shall make some inferences from what he delivers, I chuse to state the premises, from which I shall draw my conclusions, in his own words. “ I have made it my study, says Dr. Lind, for some years, with unwearied diligence, to observe the effects of all the medicines and methods of cure which have been recommended for this disease, by putting them

to the fairest trial. For this purpose, I not only sent abroad various medicines to be administered to patients by way of experiment at sea, but have at different times selected a number of patients in Haslar hospital, and administered to them, in various forms, all the different anti-scorbutic remedies ; the principal of which were, the scorbutic juices of the London Dispensatory ; the juice of the scurvy-grass by itself ; the Peruvian bark in large quantities ; the decoction of the guaiacum and saffrafras ; infusions of juniper-berries ; and stomachic bitters of various kinds ; both the decoction and juices of the fir-tops, the pines, &c. In order to judge of the effects of each of these medicines, the patients selected to use them were confined in wards by themselves ; they were strictly watched, and debarred from eating any green vegetables, fruits, or roots whatever, though many of them had not tasted any thing of that sort for several

months: they were not permitted even to taste the hospital broth. Their breakfast was balm-tea, with bread and butter; for dinner they had light pudding; and for supper, water-gruel, with bread and butter. Upon a daily comparison of all these patients, I was surprised to find them all recovering pretty much alike; and though they abstained altogether from vegetables, yet they in general grew better. I have also endeavoured to discover the comparative effects of different fruits and vegetables in this disease. For this purpose, after restraining the patients from all other vegetables or medicines, I gave to some salads of water-creffes and scurvy-grafs; to others, garden-creffes, endive, dandelion, and lettuce; and to others, ripe fruits, as plums, apples, currants, &c.; but could not observe a superior anti-scorbutic virtue in any of those, as the patients who eat them did not recover sooner than those who had daily
given

given them the hospital broth, with boiled beef and greens." What are the conclusions which may be drawn from these facts? One who is not disposed to arrogate a greater merit to physic than is due to it, would be apt to say with Dr. Lind, that the scurvy presents a wonderful instance of the quick diminution of the effect from the cessation of the cause; and that, as this disease is brought on by the moisture, &c. on board ship, and an indigestible diet; so, on the removal of these causes, on sailors being put into dry beds on shore, and fed with a light nourishing diet, the mischievous consequences of this disease soon disappear. All those means of cure which have been enumerated, may however be reduced to the following heads: to the nutrientia, sudorifica, diuretica, stimulantia, and the tonica. The first of these act upon the simple solid. By repairing the necessary and daily waste of the machine, which could not be replaced by an indigestible diet or insufficient food,

nourishment restores that state to the fibre which is requisite to the due action of the vital power. By giving that degree of plethora which is necessary to promote the various secretions and excretions of the body, it prevents that principle from being weakened by the retention of impure matters, the evacuation of which leaves it in a condition capable of properly exercising its functions. This is the manner in which I conceive the fresh flesh-broths simply, the broths of the Haslar hospital, and the boiled beef and greens, have rendered the benefit which has been observed to follow, sometimes their separate, and at others their joint use. The acid juices of fruits, of the lemons and the oranges, are great promoters of perspiration and of urine. Their virtues in the cure of this disease were improved by dilution with water-gruel, which cannot well be conceived to operate otherwise than by giving that fullness to the vessels which might render the effect of the acids, as sudorifics and diuretics,

retics, more certain. But where the disease was a good deal advanced, and great weakness had taken place, a pint of rich Malaga wine, joined with four ounces of these acid juices, by its stimulant cordial properties added great efficacy to these, which was still further increased by the addition of a quantity of sugar, so as to occasion a sort of effervescence at the time of taking this mixture. That the wine, and the active spirit discharged by this effervescence, are useful, by their cordial and stimulant qualities, and by concurring with the acids in gently promoting the proper excretions of the skin, and the kidneys, seems evident from the happy presage always drawn in this disease, when the skin, from having been dry, becomes soft and moist. Dr. Lind moreover informs us, that the effects of this cordial mixture actually were sudorific and diuretic. This view of the subject affords us some means of accounting for the bene-

ficial effects ascribed to the mineral waters in the scurvy. In consequence of the considerable quantity of fixed air they contain, they are stimulant and diuretic. With these virtues, the Seltzer waters, though the most putrescent of the mineral waters, are recommended by Hoffman in this complaint. The scurvy-grass, the water-creffes, are endowed with peculiarly acrid stimulating juices, the operation of which is probably heightened by the volatile elastic principle which they discharge. Kramer, at a time when fixed air was not so fashionable a topic of praise as it is at present, and before it was known to be the matter discharged by vegetables in their fermentations, observed, that in a thousand patients he had cured of the scurvy by the juices of the scurvy-grass and creffes, each dose of the juices occasioned prodigious belchings and wind. It was so uncommon, that he says, he imagined it proceeded from the “volatile and active salts”
 of

of these plants, set loose in the stomach. I agree perfectly with an ingenious gentleman *, who asserts, that the good effects of the alcalescent and aromatic plants in the cure of the scurvy, cannot arise from their antiseptic qualities, as those plants yield an exceedingly small portion of the vinous or acetous principle, and many of them so very little, as scarcely to be discovered by any process whatever. Their effects seem with reason to be ascribed to those penetrating, warming, diuretic and sudorific qualities, by which they promote a free perspiration from the surface of the body, and a copious discharge of urine. It is by the same properties, I conceive, that a clove of garlick taken of a morning, has proved an excellent preservative against the attack of this disease. These warming, penetrating substances are by their stimuli in effect tonic : like the bark, they

* See Dr. Wilson's Observations relative to the influence of climate on vegetable and animal bodies, page 206.

brace the fibres in some degree, and restore a proper degree of force to the contractions of the vessels. The means then, and the medicines made use of for the cure of the scurvy, seem to add confirmation to the doctrine I have advanced respecting it. They consist in such things as act upon the simple solid, as nourishment: and in such medicines as operate upon the moving fibres, as sudorific, diuretic, stimulant, or tonic remedies.

But a very different interpretation has been put upon the mode in which these medicines operate. The scurvy having been supposed to consist in a putridity of the blood, the means found useful in the cure of it have been said to act upon its mixture, and to produce their good effects by changing the corrupt state of our fluids into a sound one. It has been in virtue of their antiseptic qualities, that the various substances which have been mentioned, have been conceived to render service. Much, however,

however, as people of late years have been attached to the doctrine of antiseptics, I trust there is hardly any one who could venture so ridiculous an idea, as to speak of fresh flesh-broths under that title, or who would ascribe their good effects to such an operation. The benefits derived from garlic, from the aromatic and the alcalescent plants, seem to be as little explicable in that way. The most faithful observations on this disease teach us, that the acids, the wine, &c. do in fact operate by perspiration and by urine. To speak of an evacuant as an antiseptic, seems to be a solecism in language. A person might with equal propriety talk of an antiseptic emetic or purgative, as of an antiseptic sudorific or diuretic. In so far as any of these classes of medicines promote the discharge, by the emunctories, of those parts of the body which are constantly and necessarily degenerating into corruption, and which, if accumulated in the body, might be prejudicial in the manner which has been

explained ; or in so far as any of these remedies, by a tonic effect on the moving fibre, prevent a general tendency in the system to putridity, they may be entitled to the name of antiseptics, and certainly do effectually guard the body from putrefaction. But this does not seem to come up to the idea which has been inculcated respecting antiseptics. This term has been applied to such matters as have been said to have a power, not only of retarding or preventing putrefaction in animal substances, but of changing them, when corrupted, into a sound state ; and their operation upon things out of the body, has been given as a criterion by which we are to judge of the properties they will exert within it. But this is a rule which, I profess, does not appear to me to be either founded in reason, or to be warranted by experience. The only security which we have against the effects of putrid matters, seems to depend upon guarding the body against the admission of those which

threaten us externally, or in procuring the discharge of such as may have been generated within the body, or may by any accident have been received into it. It is with the greatest diffidence that, against the authorities which have maintained the contrary, I presume to suggest a doubt whether the most powerful antiseptics be able to hinder the generation of putridity in the body, or whether they be capable of changing any corrupt matters within it into a sound state. If these suspicions should appear to be well founded, then surely the doctrine of antiseptics will rest upon a very precarious foundation, and the labour which has of late years been devoted to ascertain the antiseptic qualities of every drug which has attracted our notice, may perhaps be thought to have been placed on things less worthy of the attention and industry of physicians, than many objects which they might otherwise have pursued.

To justify the doubts I have thrown out,

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I shall here beg leave to enter into a short relation of the experiments upon which Sir J. Pringle founded his doctrine of antiseptics, and I shall endeavour to point out those, in my opinion, hasty inferences, by which they were attempted to be made guides to us in the prevention and in the cure of putrid diseases.

Sir J. Pringle *, by experiments made on the flesh, and on the fluids of animals, found that there were many substances in nature which had a power not only of preserving them from putrefaction, but of restoring them to a firm sound state when corrupted. These substances are called antiseptics. A piece of flesh strewed with the salt of hartshorn powdered, being kept a twelve-month, remained untainted, and as firm as at first. Another piece of flesh, that had become soft, spongy, and putrid, was thrown into a few ounces of an infusion of camomile-flowers, and, the liquor being renewed

* See the Appendix to his Works.

two or three times in as many days, the flesh lost its fœtor, and, being put into a clean phial with a fresh infusion, was found at the end of a twelvemonth firm and uncorrupted. The class of antiseptics is now become one of the most extensive in the whole materia medica ; and, what perhaps may seem extraordinary, things the most opposite in their natures agree in possessing an antiseptic power. Acids, alkalis both fixed and volatile, neutral salts, earthy and metallic salts, essential and empyreumatic oils, vegetables of most kinds, are all endued with antiseptic qualities ; the degree, however, of antiseptic power varies in different substances. The comparative antiseptic powers of these various matters, Sir J. Pringle has endeavoured to ascertain with wonderful accuracy and industry. His first object was to procure a standard, to which he might refer the antiseptic powers in different matters. This he made of common salt, a slight resister of putrefaction, according

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ing to the learned gentleman. I shall beg leave to copy this experiment, as it may elucidate any further investigation into this subject.—Three pieces of the lean of fresh beef, each weighing two drachms, were put separately into wide-mouthed phials, two ounces of cistern-water were added to each; in one, was dissolved thirty grains of common sea-salt; in another, sixty; but the third contained nothing but flesh and water. These phials were little more than half full, and being corked, were placed in a lamp furnace, regulated by a thermometer, and kept to the degree of the human body. In about ten or twelve hours after, the contents of the phial without salt had a faint smell, and in two or three more became putrid. In an hour or two longer, the flesh with the least salt was tainted; but that which had most, remained sweet about thirty hours after infusion. The use of this experiment was to judge of the septic or antiseptic strength of bodies. Thus, if water with
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any ingredient preserved flesh better than without it, or better than with the addition of salt, that ingredient might be said to resist putrefaction more than water alone, or water with thirty or sixty grains of sea-salt. But if, on the other hand, water with any addition brought on corruption faster than when pure, the substance added was to be reckoned a promoter of putrefaction. Of all the substances which have been compared with this standard, camphire seems to be the most powerful ; it is three hundred times more antiseptic than common salt. Camomile-flowers and Virginia snake-root are only one hundred and twenty times more antiseptic than the standard. The Peruvian bark, though somewhat inferior to the two last, has a considerable antiseptic power. Besides these, pepper, ginger, saffron, contrayerva-root, galls, dried sage, rhubarb, the root of the wild valerian, the leaves of mint, angelica, ground-ivy, fena, green tea, and red-roses, are to be reckoned among the

powerful resisters of putrefaction. I could add some hundred articles to this list of antiseptics : but, to compleat the catalogue, I must refer the reader to such books as treat specifically of them *. I must add, however, that I have no doubt but that the experiments which have been mentioned were carefully made, and that they are faithfully related. It is not their accuracy which I shall venture to impeach. It is their application, and the conclusions from them, which I shall presume to question. I cannot bring myself to think, that the furnace or crucible of a chymist affords a fair criterion by which we are to judge of the nature of a medicine, or that the change which it produces on the dead fibre, is to be a rule by which we are to estimate the probable effects of it on the animated machine. Because the volatile and fixed alkaline salts preserve dead substances from putrefaction

* V. Traité pour servir à l'Histoire de la Putrefaction.

in the furnace, are we justified in making the inference which Sir J. Pringle has done, and upon which all this system hinges, that neither the volatile nor fixed alkaline salts tend naturally to promote putrefaction “within the body?” Had it been observed that their effects on the living body were antiseptic, his experiments might have been deemed a satisfactory explanation of their operation. It is our duty first to ascertain facts from experience before we attempt to account for them. An appeal to that tribunal will, I believe, not be very favourable to the system of which we are speaking.

It must surely strike every unprejudiced mind with surprize, that, with a list of such powerful antiseptics as that we now possess, the idea of a putrid disease should still be matter of so much alarm. It must appear extraordinary, that whilst we are daily making considerable additions to the catalogue of those substances which have a power of

preserving the dead fibres of animals from putrefaction, the list of our remedies against putrid diseases should be daily diminishing ; I should have conceived, that this very circumstance would have led people to suspect, that experiments upon substances out of the body, do not afford any very certain criterion of the nature or operation of them within it. It will be said, perhaps, that we have occasion only for the most powerful antiseptics ; and that, the application of the stronger precluding the use of the weaker, will account for the small number of medicines which we exhibit in these complaints. Were this the case, it surely would be a sufficient answer to the objection : but, unfortunately for the solution, the fact is quite otherwise. When we descend to particulars, we shall find that the weaker antiseptic is frequently a more powerful remedy against putrid diseases than the stronger antiseptic and that a medicine possessing very little or no antiseptic qualities out of the body,

body, is more efficacious against putrid diseases than one which has very great preservative virtues. We shall even find, that substances which have an antiseptic effect on the dead fibres of animals, often produce putrid symptoms in the living body. Though the records of physick do not afford an example of exemption from putrid diseases by antiseptics ; though, notwithstanding our daily use of infusions of tea, of mint, of sage, of camomile-flowers, those powerful resisters of putrefaction, we are still liable to suffer from putrid epidemic contagions ; there are many indubitable and well-attested instances, that both the fixed and the volatile alkalies have produced putrid symptoms of various kinds in the human body. These effects have particularly been observed to follow the too free use of Mrs. Stephens's medicine. Haller * faithfully records these
pernicious

* Sed in *vivente* etiam homine lixivi sales, qui Stephaniano medicamento efficaciam præstant, longo usu

pernicious effects of the alkalies ; and, when he compares these practical facts with the result of the late experiments, proving the antiseptic properties of the alkalies, he seems to be quite confounded. He admits that there is a contradiction between them, which he is unable to reconcile. Had he reflected a little, he would have seen how, even upon his own principles, those alkaline substances must be disposed to produce these putrid effects in the animated machine. Excess of heat and motion, which he considers among the principal causes of putridity in the animal œconomy, are extremely apt to be occasioned by these stimulating

*sanguinem alcalinum, acrem, scorbuticum, hecticumque reddiderunt ut etiam vesicas de cute elevaverit *. Hinc a saponis usu et a lotione linteorum proxima pestis erumpit, et in vico Linteariorum Constantinopoli amat sævire. Vide tom. iii. p. 161. Op. Halleri de Partium corporis humani præcipuarum fabricâ et functionibus.*

* Haller quotes Huxham on Fevers, and Parsons on the Bladder, to these facts.

alkalies. And we know that there is nothing which tends more to impair the *natura irritabilis*, or the vital power, gradually, than the habitual use of stimuli, the strength of which we require to be increased, to produce the same effects, the more we allow ourselves the use of them. It is therefore no way surprising, that the long continuance of such a medicine as Mrs. Stephens's should often excite putrid symptoms. These stimulant effects of the alkalies have not been unnoticed by Sir J. Pringle himself. If putrefaction, says he, be begun from a languid or obstructed circulation, the volatiles may then, by their stimulant and aperient qualities, be the means of stopping its progress: but if the humours be disposed to corruption from excess of heat and motion, these very salts, by adding to the cause, may augment the disease. Their effects, then, being various, according to the state of the living body, he proposes his experiments on dead sub-

stances as the fairest criterion of the nature of the volatiles ; and, finding that they preserve the dead fibre from putrefaction, he asserts that neither the fixed nor the volatile alkali tend naturally to promote putrefaction within the body, though he himself points out a method by which their most obvious qualities, their stimuli, must dispose them to do so, and actually have been the cause of their producing putrid symptoms.

Plausible as this ingenious doctrine has appeared, though it may have seduced many unwary persons to accommodate their prescriptions to it, do any prudent physicians rely in their practice upon antiseptics ? Let us suppose a person attacked with a sudden and excessive prostration of strength. Let us suppose him to have a very foul tongue, with a bitter disagreeable taste in his mouth, accompanied with a severe head-ach, a shivering, a loss of appetite, and a great degree of nausea, or any other signs which
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may be considered as indicating the presence of something very offensive in the stomach; is there any skilful physician, in such a case, who, though his patient be very weak, would prescribe antiseptics; who would think of correcting this offending matter? Is there any man who would hesitate a moment to discharge it by an emetic? Or, if we should suppose a putrid colluvies in the bowels, would not a gentle laxative be preferable to the most powerful antiseptic? But if, in this weak state of the patient, we must seek for safety in evacuations; if we cannot correct these offending matters in the primæ viæ, where we can apply our antiseptic preparations in great abundance immediately to them, how much less are they to be trusted when, according to the common notions, the whole mass of the blood, to which they are only applied drop by drop from the vena cava, is depraved? It will here, perhaps, be

said, though the patient be extremely weak, though the greater evacuations by vomiting and purging should in general be avoided as much as possible, yet, as the offending matter lies in such a situation as that a single emetic or laxative, with the aid of a plenty of diluting drinks to wash off any trifling impurities remaining after their operation, may be sufficient to rid us of it, it may be proper to have recourse to them. But had the case been otherwise, had the patient been exhausted by a long previous illness, had the offending matter lain in a more remote part, and required the frequent repetition of emetics and purgatives before it could be discharged, then should we find our antiseptics of the greatest benefit and the safest resource? These would enable us to change in the body that which it might be dangerous to discharge by considerable evacuations. These would enable us to preserve the little remaining strength of our patient,

tient, and to guard him against the mischief which such impurities might produce. The putrid fever which arises in the confluent small-pox, comes within this description. In this case, the strength of the sick person has been exhausted by a long preceding illness; and, if antiseptics had the power of defeating the operation of the corrupt matter which invades almost from every quarter, they would be a most valuable acquisition: but the truth is, we dare not trust to such protectors or to such correctives, much as it were to be wished, on account of the very feeble state of the patient, that such means might avail. The frequent repetition * of purgatives to expel the corrupt matters, with cordial and tonic medicines in the intervals to enable him to support their operation, affords, under such cir-

* V. Friend de Purgatione in Febre putridâ quæ Variolis confluentibus supervenit. Comment. vii.

cumstances, the only hope of relief and recovery.

It is not, however, my desire that this system should be tried by such tests alone as I have suggested ; I would make the learned author of it the judge in his own cause: I would set his own experience against his experiments, and would make the result of the former the criterion of the utility of the latter, with respect to medical practice. Let us examine how he treats a jail or an hospital fever. As soon as he suspected a person to be attacked by it, he removed him from the impure air of the confined place. The modes which he used of preventing the disease from actually taking place, were calculated with great wisdom, and consist in evacuating medicines ; in emetics, sudorifics, and laxatives. When the disease was confirmed, he sets about combating it more seriously. The three first days he gave a powder, composed of contrayerva, nitre, and camphire ; and barley-water, acidulated with vinegar,

vinegar, to drink. But we are acquainted, that three or four days after the fever is formed, the pulse sinks, the stupor is great, a delirium is threatened, and petechiæ often appear. The learned gentleman, therefore, found it necessary to vary his method, and to have for his principal intention the support of the vis vitæ; he therefore left out the nitre in the diaphoretic powders, and substituted in its place ten grains of the Virginia snake-root. Sometimes he gave a plain decoction of this root, at others, he gave the same in a quantity from two scruples to a drachm every day. But an accident of a mortification of the back of a man, to whom he had applied a blister, inducing him to give the bark * at this period, he was
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* Besides this medicine, Sir J. Pringle afterwards used occasionally to allow his patients in this disease Rhenish wine, to the quantity of a quart a day; and they found it, he says, a very grateful efficacious cordial.

led, from the advantage derived from it, to give it at the same period in other cases ; and this he did with such astonishing success, that, though he was very unfortunate in the event of his former plan of practice, yet, out of thirty-nine cases he treated in this last method, he lost but four. Surely the good fortune of this accident can only be equalled by the candour of the learned gentleman who relates it. But, whilst we are happy in the former, which has taught us so excellent a mode of practice, and may admire the ingenuousness with which this lesson is delivered, it should not be forgotten, that the camphire, which is three hundred times more antiseptic than common salt, assisted by the preservative virtues of

dial. It must have been by its stimulant qualities that it rendered benefit ; for the Rhenish wine possesses very weak powers as an antiseptic. V. Essai pour servir à l'Histoire de la Putrefaction, p. 208.

the nitre and contrayerva, are but of little use. For petechiæ appear on the third or fourth day; the pulse is observed to be sinking so fast, that the serpentaria is substituted in the place of the nitre. But the combined powers of the camphire, the serpentaria, and the contrayerva, though they stand foremost in the list of antiseptics, are inefficacious. The bark, which is inferior to them in antiseptic virtue, exceeds them in its salutary effect as a remedy. Had the disease arisen from a putrid ferment assimilating our blood and humours to its own nature, surely the most ready way to have stopped it would have been (as Sir J. Pringle, reasoning justly on his own principles, actually attempted) to have struck at the cause of the mischief, and to have corrected the putridity of our fluids by such things as exert the strongest antiseptic power on their mixture, such as camphire, &c. But whilst he practised in this way, he was

unsuccessful.

unsuccessful. The bark, which acts on the moving fibre, which produces a tonic effect on the system, which renders its benefit whilst it is yet in the stomach, before it can possibly be blended with the circulating fluids, and of course long before it can exert any preservative virtues on their mixture, is more effectual than the most boasted antiseptic. So quick is its operation in fevers, that Sir J. Pringle himself confesses, for that reason, that its febrifuge qualities must be different from its antiseptic ones.

As I have maintained that the diminution of the vital power, whatever the remote causes of this effect may be, is the proximate cause of putrid fevers, and the immediate source of those symptoms of putridity which attend them; so this observation with respect to the cure of them, is a strong confirmation of my doctrine. In opposing the putridity of
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the fluids, which was supposed to constitute the proximate cause of these diseases, with antiseptics, we did very little to stop their progress, or to abate their virulence: but we are no sooner taught to support the vital power with tonic and stimulant medicines, than we experience the most pleasing change in the effect of our prescriptions. The flaccid weakness of the fibres, with every symptom of putridity, soon ceases, upon the correction of the cause from which it sprung.

I think I may be justified in concluding, from what has been stated, that the effect of any substance in preserving the dead fibres of animals from putrefaction, is by no means a rule by which we are to judge of the propriety of exhibiting it, or of the advantage to be derived from the use of it in a putrid disease. Many things, which in the furnace or the laboratory of the chymist resist putrefaction powerfully, have no such operation in the animal machine. The habi-

tual and daily use of antiseptics does not prevent putrid diseases. The application of the most efficacious ones does not cure them. The vegetable acids are serviceable by gently promoting the proper excretions by the skin and by the kidneys. When their operation by these means is increased, and the body at the same time strengthened by warming stimulant additions, they are rendered more beneficial. The bark operates by its tonic strengthening powers. But if the vegetable acids, or the bark, possessed only antiseptic qualities, they would probably be useless in putrid cases. The root of the wild valerian is one of the most powerful antiseptics out of the body which is at this day known. It is superior in that respect to the vegetable acids, and to the bark. It has no qualities which should limit us, either in the quantity, or in the mode of giving it. It may be exhibited in substance, in decoction, in infusion, and in tincture. But it is a medicine of no virtue in a putrid disease.

disease. Guaiacum, after it has been almost exhausted by repeated decoctions, has still communicated such properties to water, as to enable it to render meat immersed in it unsusceptible of change; and yet, in the exigency of putrid fevers, it is neither prescribed nor relied upon. In the scurvy, as in the venereal disease, guaiacum may be beneficial by promoting the proper discharges by the skin. But if in the latter case the vital power be diminished, and the patient be much weakened by the long and continued use of mercury, the decoction of guaiacum, taken daily and copiously, will not prevent a tendency to putridity: it will not prevent the offensive smell, the foul breath, &c. attendant on that condition. The antiseptic nature of the alkalies has not hindered them from producing putrid symptoms in the living body.

To be assiduous then to ascertain the antiseptic operation of any matters in a crucible or a furnace, seems, for the purposes of

physick, to be labour misapplied. To say that, “because any substance under such circumstances is antiseptic, it must therefore be of use in putrid diseases,” is a fallacious conclusion, neither warranted by reason or experience. The means of preserving dead substances from putrefaction, are no way applicable to the living moving fibre, which is governed by a different law, a law peculiar to itself. The seat of putrid diseases is in the solids. The causes which induce them impair the moving fibres, and require medicines which act upon the same parts of our machine to correct them. Hence it is that putrid diseases are but little affected by such things as operate only upon the mixture of our fluids, which is the case of those matters which are merely antiseptic. It may perhaps be said, that Sir J. Pringle himself, in many important particulars, discovered accidentally a mode of practice more efficacious than that to which his doctrine of antiseptics at first led him ; that

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he deferred to experience, and made it the guide of his prescriptions; and that, as he has taught us to avoid the mischief which his system might occasion, any observations on the futility of it are at this time unnecessary. There is no one, I am sure, who is more disposed to do justice to the learned gentleman than myself; and was I certain that every one, who had learnt the doctrine of antiseptics, would forget it at the bedside of his patient, and make his example the rule of his practice, I might have foregone the unpleasant task of criticism, which I have unwillingly executed. But I have had occasion to hear the doctrine of antiseptics taught in places where the learned gentleman's mode of treating diseases is very little followed; in places where strong prejudices against the bark still remain, and where people would be glad to avail themselves of the plausible pretence of exhibiting a more powerful antiseptic, to
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postpone the use of it. In the various schools of physick, too, which it has been my duty to frequent, it has not been uncommon for students to possess lists of antiseptics, arranged according to their comparative power of resisting putrefaction in the dead fibre, and to pass from the College to the exercise of their profession, more impressed with the ingenious theory which has been mentioned, and with the utility of such catalogues to assist their prescriptions, than fraught with proper rules to direct their practice. It may possibly be useful that such persons should be apprized of the fallacies I have pointed out; and it will surely be more for the interest of mankind, that they should consider them at their entrance into business, than that they should learn the groundlessness of these theoretical opinions in the disappointed hope of relieving their patients, or that they should wait for so fortunate an incident as occurred to Sir

J. Pringle, to be informed of the errors into which they must necessarily be led by adopting his system.

F I N I S.



